

**Tobyhanna Army Depot
Tobyhanna, PA
11 Hap Arnold Boulevard
Tobyhanna, PA 18466**

**Addendum to Third Five-Year-Review Report
Tobyhanna Army Depot, June 2013**

The Third Five-Year Review Report for Operable Unit (OU) 1, OU-4 and OU-5 at Tobyhanna Army Depot (TYAD) in Tobyhanna, PA was signed by Nathaniel Edwards, Chief, Environmental Management Division and Joseph Maciejewski, Director of Industrial Risk Management in September 12. TYAD received a concurrence letter for the Third Five-Year Review Report from the Environmental Protection Agency (EPA) signed by Ronald J. Borsellino, Director, Hazardous Site Cleanup Division on 25 September 12. In the concurrence letter, the EPA stated that the remedy for OU-1 is protective in the short term and that further action was required to be protective in the long term. EPA's protectiveness statement for OU-1 is as follows:

OU-1: Contaminated groundwater attributable to Areas A and B.

Protectiveness Statement that will be reported to Congress: The remedy at OU-1 is protective in the short term; however, in order for the remedy to be protective in the long-term, follow-up actions need to be taken.

The Protectiveness Statement for OU-1 was deemed protective in the short term due to inconclusive results of a vapor intrusion investigation that TYAD was conducting for OU-1. During the second round of sampling of the vapor intrusion investigation, trichloroethene (TCE) was detected in the first floor of a residential home, identified as R1-111 at a concentration of 52 $\mu\text{g}/\text{m}^3$. This exceeds both the Regional Screening Level (RSL) of 0.43 $\mu\text{g}/\text{m}^3$ and Pennsylvania's Medium Specific Concentration (MSC) for Indoor Air Quality of 12 $\mu\text{g}/\text{m}^3$. This was the only sample from the vapor intrusion investigation where contaminants were detected above the RSL or MSC. Neither the basement nor the first floor were found to have levels above the MSC or RSL in the first round. During the second round, the basement was also below the RSL/MSC. Although it appeared likely that the high concentration found in the first floor during the second round was from a household source, the EPA determined that the protectiveness statement could not be considered "protective" until this residence was resampled. The EPA and TYAD agreed to conduct additional sampling to determine if TCE found in R1-111 was due to vapor intrusion from groundwater contaminants or from a household source.

Progress Since the Five-Year Review Completion Date

On 20 September 12, an additional round of air sampling was conducted at R1-111 (report attached). There were no contaminants found during this sampling. TYAD and the EPA are in agreement

that the TCE detected in R1-111 during the second round of sampling was from a household source and not from groundwater contaminants intruding into the residence. TCE was not detected during the first or third sampling rounds. Also, there was no evidence of contamination found in the path that the vapor would have had to travel to get from the groundwater to the first floor of R1-111 since TCE was never found in the basement or sump water of R1-111. TYAD and EPA agree that vapor intrusion is not a concern for the residents near TYAD.

The final vapor intrusion investigation report at TYAD was completed and sent to the EPA in Mar 13. The EPA reviewed the report and sent a concurrence letter to TYAD in May 13 (attached) stating that the EPA concurs with TYAD's recommendation that the vapor intrusion investigation be closed with no further action.

Issues and Recommendations

No additional issues to those identified in the third five-year review that affect the protectiveness were found in this addendum.

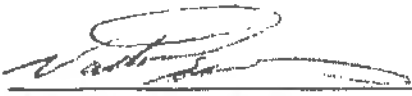
Protectiveness Statements

Based on new information and/or actions taken since the Five-Year Review completion date, the Protectiveness Statement for OU- 1 is being revised as follows:

The remedy at OU-1 remains protective of human health and the environment.

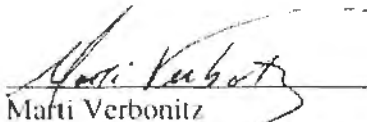
Next Five-Year Review

The next five-year review will be completed in 2017, five years after the signature of the last five-year review report.



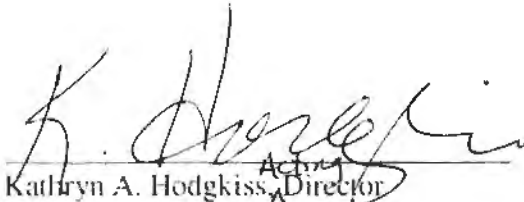
Nathaniel W. Edwards
Chief, Environmental Management Division
Tobyhanna Army Depot

Date 16 July 2015



Marti Verbonitz
Director, Industrial Risk Management
Tobyhanna Army Depot

Date 17 July 2013



Kathryn A. Hodgkiss, Director
Hazardous Site Cleanup Division
Environmental Protection Agency, Region III

Date 7/23/2013

ATTACHMENT 1: REFERENCES

NOVEMBER 2012 FINAL Vapor Intrusion Pathway Study Report Tobyhanna Operable Unit 1
prepared for U.S. ARMY CORPS OF ENGINEERS BALTIMORE DISTRICT
Prepared by WESTON SOLUTIONS, INC.

THIRD FIVE-YEAR REVIEW REPORT FOR TOBYHANNA ARMY DEPOT
prepared for U.S. ARMY CORPS OF ENGINEERS BALTIMORE DISTRICT
Prepared by WESTON SOLUTIONS, INC.

ATTACHMENT 2: Third Five-Year Review Concurrence Letter From the EPA



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

SEP 25 2012

Mr. Nathan Edwards
Chief, Environmental Management Division
Department of the Army
Tobyhanna Army Depot
11 Hap Arnold Boulevard
Tobyhanna, PA 18466-5086

Subject: Five-Year CERCLA Review of the Tobyhanna Army Depot, Tobyhanna, Pennsylvania

Dear Mr. Edwards:

Thank you for submitting the Five-Year Review report entitled: Third Five-Year Review Report Tobyhanna Army Depot, Tobyhanna, Pennsylvania, dated September 2012. The purpose of this letter is to provide concurrence on the above-referenced report.

As you know, Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at a site above levels that allow for unlimited use and unrestricted exposure be subject to a five-year review (5YR).

There are currently three Operable Units (OUs) at the Tobyhanna Army Depot that require a 5YR protectiveness determination and are therefore addressed in this 5YR. Summaries for these OUs are provided below for documentation purposes, along with a discussion of any issues EPA or the Army has identified that need to be addressed.

OU- 1: Contaminated groundwater attributable to Areas A and B.

Issues: During the second round of vapor sampling there was a detection of TCE on the first floor of one of the residences. The basement had no detection of TCE. Additional information is necessary to determine whether this release was due to vapor intrusion or to a household source.

It has been 15 years since the MNA remedy was selected, and the Remedial Action Objectives (RAOs) have not yet been achieved.

Recommendations and Follow-up Actions: The Army has recommended that the residence with the elevated level of TCE in air on the first floor be re-sampled. They have also recommended that the MNA remedy for OU-1 be re-evaluated along with the development of an exit strategy to determine when the RAOs have been met before the next Five-Year Review as part of the Annual Performance Evaluations. EPA agrees with these recommendations.

Protectiveness Statement that will be reported to Congress: The remedy at OU-1 is protective in the short-term; however, in order for the remedy to be protective in the long-term, follow-up actions need to be taken.

OU- 4: UXO Area

Issues: No issues

Recommendations and Follow-up Actions: None

Protectiveness Statement that will be reported to Congress: The remedy at OU-4 remains protective of human health and the environment.

OU-5: Groundwater contamination attributable to releases from the Inactive Landfill

Issues: Based on the concentration trends of some of the contaminants of concern, it does not appear that the RAOs will be met in the time frame indicated in the remedy. TCE in particular has increased in concentration in several bedrock wells onsite since 2004. However, the concentrations of TCE and other contaminants found in the off post groundwater monitoring wells that are downgradient of OU-5 continue to be below the MCLs, and there are no receptors in that area so the remedy continues to be protective.

Recommendations and Follow-up Actions: Based on the upward trends observed for the COCs at OU-5, the Army recommends that the MNA remedy for OU-5 be re-evaluated before the next Five-Year Review as part of the Annual Performance Evaluations. EPA agrees with this recommendation.

Protectiveness Statement that will be reported to Congress: The remedy at OU-5 remains protective of human health and the environment.

The EPA concurs with the Army's protectiveness statements for OU-4 and OU-5. However, recognizing that some additional investigation is necessary to evaluate the elevated level of TCE found in the air in the first floor of one residence, the EPA is recommending revising the protectiveness statement for OU-1 to "Protective in the short-term; however, in order for the remedy to be protective in the long-term, follow-up actions need to be taken.

During the second Five Year Review, EPA evaluated the Government Performance and Results Act (GPRA) measures for TYAD and had determined their status as follows:

Environmental Indicators

Human Health: Under Control

Groundwater Migration: Under control

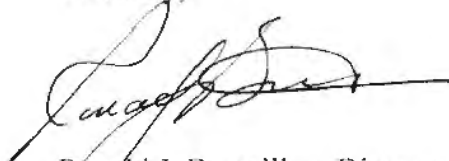
Sitewide Ready for Anticipated Use

The site is Site-Wide Ready for Anticipated Use.

These GPRA measures remain effective for this reporting period. The next Five Year Review will be due on 27 September 2017, five years from the due date of this report.

If you have any questions, please contact Steve Hirsh, Acting Chief of the NPL/BRAC Federal Facilities Branch at 215-814-3351 or Lorie Baker at 215-814-3355.

Sincerely,



Ronald J. Borsellino, Director
Hazardous Site Cleanup Division

cc: Robert Lewis, Pennsylvania Department of Environmental Protection

ATTACHMENT 3: Additional Air Sample Report From R1-111.

ANALYTICAL REPORT

Job Number: 200-12833-1

SDG Number: 200-12833

Job Description: Tobyhanna

For:

Weston Solutions, Inc.

1400 Weston Way

PO BOX 2653

West Chester, PA 19380

Attention: Mr. Christopher Moran



Approved for release.
Don C Dawicki
Customer Service Manager
10/5/2012 8:11 AM

Don C Dawicki
Customer Service Manager
don.dawicki@testamericainc.com
10/05/2012

The test results in this report relate only to sample(s) as received by the laboratory. These test results were derived under a quality system that adheres to the requirements of NELAC. Pursuant to NELAC, this report may not be produced in full without written approval from the laboratory

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CASE NARRATIVE

Client: Weston Solutions, Inc.

Project: Tobyhanna

Report Number: 200-12833-1

The samples in this sample set were analyzed by the EPA Compendium Method TO-15 for specific volatile organic constituents. Unless otherwise noted below, the analytical work followed the requirements outlined in the New Jersey DEP guidelines.

The practice of the laboratory is to analyze one canister from each batch of canisters that have been cleaned for re-use in order to certify the batch. The canisters that were used for this sampling event were from multiple batches. The certifying analyses were free of target analytes down to the concentration levels that are contractually required (nominally 0.2 PPBV). In order to provide for the lower level of detection required for canister certification, the laboratory analyzed a 500 milliliter volume. The laboratory's established practice for the analysis of field samples is based on the analysis of a 200 milliliter sample volume. Documentation of the analytical work supporting canister certification is included in the "Clean Can Certification" section of this submittal. Documentation of canister vacuum as delivered to, and received from, the field is included in the "Clean Can Certification" section of this submittal.

Manual integration was employed in deriving certain of the analytical results. The values that have been derived from manual integration are qualified on the quantitation reports, and extracted ion current profiles are included in the data package.

The following details the column type and trap design that were used in the performance of the analytical work for the sample in this sample set:

Chromatography Column - Restek RTX-624
Length - 60 meters
Inner Diameter - 0.32 millimeters
Film thickness - 1.8 micrometers
Trap Design - Entech Model 7100A (glass bead and Tenax with cryo-focusing)

A summary of the laboratory's current Method Detection Limits (MDLs) has been provided as part of this submittal, immediately following this transmittal letter.

RECEIPT

The samples were received on 09/24/2012; the samples arrived in good condition.

LOW LEVEL VOLATILE ORGANIC COMPOUNDS

Sample R1111-IAF-F 12-0 was analyzed for Low Level Volatile Organic Compounds in accordance with EPA Method TO-15. The samples were analyzed on 09/28/2012.

Sample R1111-IAF-F 12-0[3X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No difficulties were encountered during the Low Level VOC analysis.

All quality control parameters were within the acceptance limits.

AIR - GC/MS VOA MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Burlington Job No.: 200-12833-1SDG No.: 200-12833Instrument ID: E.i Analysis Batch Number: 38293Lab Sample ID: IC 200-38293/3 Client Sample ID: _____Date Analyzed: 05/07/12 15:17 Lab File ID: eev003.d GC Column: RTX-624 ID: 0.32 (mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|-------------------------|-------------------|--------------------------------------|---------|----------------|
| | | REASON | ANALYST | DATE |
| Methyl tert-butyl ether | 7.96 | Baseline event | wrd | 05/08/12 08:43 |
| 1,1,2-Trichloroethane | 14.20 | Peak not found by the data system | wrd | 05/08/12 08:25 |
| Bromoform | 16.62 | Peak not found by the data system | wrd | 05/08/12 08:26 |

Lab Sample ID: IC 200-38293/4 Client Sample ID: _____Date Analyzed: 05/07/12 16:11 Lab File ID: eev004.d GC Column: RTX-624 ID: 0.32 (mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|-------------------------|-------------------|--------------------------------------|---------|----------------|
| | | REASON | ANALYST | DATE |
| 3-Chloropropene | 7.12 | Baseline event | wrd | 05/08/12 08:31 |
| Methyl tert-butyl ether | 7.93 | Baseline event | wrd | 05/08/12 08:31 |
| 1,2-Dichloroethane | 10.96 | Peak not found by the data system | wrd | 05/08/12 08:26 |

SAMPLE SUMMARY

Client: Weston Solutions, Inc.

Job Number: 200-12833-1
Sdg Number: 200-12833

| Lab Sample ID | Client Sample ID | Client Matrix | Date/Time Sampled | Date/Time Received |
|---------------|------------------|---------------|----------------------|-----------------------|
| 200-12833-1 | R1111-IAF-F12-0 | Air | 09/20/2012 1645 | 09/24/2012 0945 |

EXECUTIVE SUMMARY - Detections

Client: Weston Solutions, Inc.

Job Number: 200-12833-1

Sdg Number: 200-12833

| Lab Sample ID Analyte | Client Sample ID | Result | Qualifier | Reporting Limit | Units | Method |
|--------------------------|------------------|--------|-----------|--------------------|-------|--------|
|--------------------------|------------------|--------|-----------|--------------------|-------|--------|

No Detections

METHOD SUMMARY

Client: Weston Solutions, Inc.

Job Number: 200-12833-1

Sdg Number: 200-12833

| Description | Lab Location | Method | Preparation Method |
|--|--------------|-------------|--------------------|
| Matrix: Air | | | |
| Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) | TAL BUR | EPA TO15 LL | |
| Collection via Summa Canister | TAL BUR | | Summa Canister |

Lab References:

TAL BUR = TestAmerica Burlington

Method References:

EPA = US Environmental Protection Agency

METHOD / ANALYST SUMMARY

Client: Weston Solutions, Inc.

Job Number: 200-12833-1

Sdg Number: 200-12833

| Method | Analyst | Analyst ID |
|-------------|-----------------|------------|
| EPA TO15 LL | Keene, Angela H | AHK |

Analytical Data

Client: Weston Solutions, Inc.

Job Number: 200-12833-1

Sdg Number: 200-12833

Client Sample ID: R1111-IAF-F12-0

Lab Sample ID: 200-12833-1

Date Sampled: 09/20/2012 1645

Client Matrix: Air

Date Received: 09/24/2012 0945

TO15 LL Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

| | | | | | |
|------------------|-----------------|-----------------|-----------|------------------------|------------|
| Analysis Method: | TO15 LL | Analysis Batch: | 200-45724 | Instrument ID: | E.i |
| Prep Method: | Summa Canister | Prep Batch: | N/A | Lab File ID: | eevac007.d |
| Dilution: | 2.99 | | | Initial Weight/Volume: | 167 mL |
| Analysis Date: | 09/28/2012 1619 | | | Final Weight/Volume: | 500 mL |
| Prep Date: | 09/28/2012 1619 | | | Injection Volume: | 500 mL |

| Analyte | Result (ppb v/v) | Qualifier | RL | RL |
|---------------------------|------------------|-----------|-------|-------|
| Vinyl chloride | 0.060 | U | 0.060 | 0.060 |
| trans-1,2-Dichloroethene | 0.060 | U | 0.060 | 0.060 |
| cis-1,2-Dichloroethene | 0.060 | U | 0.060 | 0.060 |
| Trichloroethene | 0.060 | U | 0.060 | 0.060 |
| Tetrachloroethene | 0.060 | U | 0.060 | 0.060 |
| 1,2-Dichloroethene, Total | 0.060 | U | 0.060 | 0.060 |

| Analyte | Result (ug/m3) | Qualifier | RL | RL |
|---------------------------|----------------|-----------|------|------|
| Vinyl chloride | 0.15 | U | 0.15 | 0.15 |
| trans-1,2-Dichloroethene | 0.24 | U | 0.24 | 0.24 |
| cis-1,2-Dichloroethene | 0.24 | U | 0.24 | 0.24 |
| Trichloroethene | 0.32 | U | 0.32 | 0.32 |
| Tetrachloroethene | 0.41 | U | 0.41 | 0.41 |
| 1,2-Dichloroethene, Total | 0.24 | U | 0.24 | 0.24 |

Quality Control Results

Client: Weston Solutions, Inc.

Job Number: 200-12833-1

Sdg Number: 200-12833

Method Blank - Batch: 200-45724

Method: TO15 LL

Preparation: Summa Canister

| | | |
|--------------------------------|---------------------------|-------------------------------|
| Lab Sample ID: MB 200-45724/4 | Analysis Batch: 200-45724 | Instrument ID: E.i |
| Client Matrix: Air | Prep Batch: N/A | Lab File ID: eevac004.d |
| Dilution: 1.0 | Leach Batch: N/A | Initial Weight/Volume: 500 mL |
| Analysis Date: 09/28/2012 1344 | Units: ppb v/v | Final Weight/Volume: 500 mL |
| Prep Date: 09/28/2012 1344 | | Injection Volume: 500 mL |
| Leach Date: N/A | | |

| Analyte | Result | Qual | RL | RL |
|---------------------------|--------|------|-------|-------|
| Vinyl chloride | 0.020 | U | 0.020 | 0.020 |
| trans-1,2-Dichloroethene | 0.020 | U | 0.020 | 0.020 |
| cis-1,2-Dichloroethene | 0.020 | U | 0.020 | 0.020 |
| Trichloroethene | 0.020 | U | 0.020 | 0.020 |
| Tetrachloroethene | 0.020 | U | 0.020 | 0.020 |
| 1,2-Dichloroethene, Total | 0.020 | U | 0.020 | 0.020 |

Method Blank - Batch: 200-45724

Method: TO15 LL

Preparation: Summa Canister

| | | |
|--------------------------------|---------------------------|-------------------------------|
| Lab Sample ID: MB 200-45724/4 | Analysis Batch: 200-45724 | Instrument ID: E.i |
| Client Matrix: Air | Prep Batch: N/A | Lab File ID: eevac004.d |
| Dilution: 1.0 | Leach Batch: N/A | Initial Weight/Volume: 500 mL |
| Analysis Date: 09/28/2012 1344 | Units: ug/m3 | Final Weight/Volume: 500 mL |
| Prep Date: 09/28/2012 1344 | | Injection Volume: 500 mL |
| Leach Date: N/A | | |

| Analyte | Result | Qual | RL | RL |
|---------------------------|--------|------|-------|-------|
| Vinyl chloride | 0.051 | U | 0.051 | 0.051 |
| trans-1,2-Dichloroethene | 0.079 | U | 0.079 | 0.079 |
| cis-1,2-Dichloroethene | 0.079 | U | 0.079 | 0.079 |
| Trichloroethene | 0.11 | U | 0.11 | 0.11 |
| Tetrachloroethene | 0.14 | U | 0.14 | 0.14 |
| 1,2-Dichloroethene, Total | 0.079 | U | 0.079 | 0.079 |

Lab Control Sample - Batch: 200-45724

Method: TO15 LL

Preparation: Summa Canister

| | | |
|--------------------------------|---------------------------|-------------------------------|
| Lab Sample ID: LCS 200-45724/3 | Analysis Batch: 200-45724 | Instrument ID: E.i |
| Client Matrix: Air | Prep Batch: N/A | Lab File ID: eevac003.d |
| Dilution: 1.0 | Leach Batch: N/A | Initial Weight/Volume: 500 mL |
| Analysis Date: 09/28/2012 1249 | Units: ppb v/v | Final Weight/Volume: 500 mL |
| Prep Date: 09/28/2012 1249 | | Injection Volume: 500 mL |
| Leach Date: N/A | | |

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|--------------------------|--------------|--------|--------|----------|------|
| Vinyl chloride | 0.200 | 0.216 | 108 | 70 - 130 | |
| trans-1,2-Dichloroethene | 0.200 | 0.190 | 95 | 70 - 130 | |
| cis-1,2-Dichloroethene | 0.200 | 0.185 | 93 | 70 - 130 | |
| Trichloroethene | 0.200 | 0.177 | 89 | 70 - 130 | |
| Tetrachloroethene | 0.200 | 0.144 | 72 | 70 - 130 | |

DATA REPORTING QUALIFIERS

Client: Weston Solutions, Inc.

Job Number: 200-12833-1

Sdg Number: 200-12833

| Lab Section | Qualifier | Description |
|-----------------|-----------|--|
| Air - GC/MS VOA | U | Indicates the analyte was analyzed for but not detected. |

Quality Control Results

Client: Weston Solutions, Inc.

Job Number: 200-12833-1

Sdg Number: 200-12833

QC Association Summary

| Lab Sample ID | Client Sample ID | Report Basis | Client Matrix | Method | Prep Batch |
|--------------------------|--------------------|--------------|---------------|---------|------------|
| Air - GC/MS VOA | | | | | |
| Analysis Batch:200-45724 | | | | | |
| LCS 200-45724/3 | Lab Control Sample | T | Air | TO15 LL | |
| MB 200-45724/4 | Method Blank | T | Air | TO15 LL | |
| 200-12833-1 | R1111-IAF-F12-0 | T | Air | TO15 LL | |

Report Basis

T = Total

Quality Control Results

Client: Weston Solutions, Inc.

Job Number: 200-12833-1
SDG: 200-12833

Laboratory Chronicle

Lab ID: 200-12833-1

Client ID: R1111-IAF-F12-0

Sample Date/Time: 09/20/2012 16:45

Received Date/Time: 09/24/2012 09:45

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|------------------|---------------|-----|----------------|------------|--------------------------|------|---------|---------|
| P:Summa Canister | 200-12833-A-1 | | 200-45724 | | 09/28/2012 16:19 | 2.99 | TAL BUR | AHK |
| A:TO15 LL | 200-12833-A-1 | | 200-45724 | | 09/28/2012 16:19 | 2.99 | TAL BUR | AHK |

Lab ID: MB

Client ID: N/A

Sample Date/Time: N/A

Received Date/Time: N/A

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|------------------|----------------|-----|----------------|------------|--------------------------|-----|---------|---------|
| P:Summa Canister | MB 200-45724/4 | | 200-45724 | | 09/28/2012 13:44 | 1 | TAL BUR | AHK |
| A:TO15 LL | MB 200-45724/4 | | 200-45724 | | 09/28/2012 13:44 | 1 | TAL BUR | AHK |

Lab ID: LCS

Client ID: N/A

Sample Date/Time: N/A

Received Date/Time: N/A

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|------------------|-----------------|-----|----------------|------------|--------------------------|-----|---------|---------|
| P:Summa Canister | LCS 200-45724/3 | | 200-45724 | | 09/28/2012 12:49 | 1 | TAL BUR | AHK |
| A:TO15 LL | LCS 200-45724/3 | | 200-45724 | | 09/28/2012 12:49 | 1 | TAL BUR | AHK |

Lab References:

TAL BUR = TestAmerica Burlington

Certification Summary

Client: Weston Solutions, Inc.
Project/Site: Tobyhanna

TestAmerica Job ID: 200-12833-1
SDG: 200-12833

| Laboratory | Authority | Program | EPA Region | Certification ID |
|------------------------|----------------------------|------------------|------------|------------------|
| TestAmerica Burlington | ACLASS | DoD ELAP | | ADE-1492 |
| TestAmerica Burlington | Connecticut | State Program | 1 | PH-0751 |
| TestAmerica Burlington | DE Haz. Subst. Cleanup Act | State Program | 3 | NA |
| TestAmerica Burlington | Florida | NELAC | 4 | E87467 |
| TestAmerica Burlington | Louisiana | NELAC | 6 | 176292 |
| TestAmerica Burlington | Maine | State Program | 1 | VT00008 |
| TestAmerica Burlington | Minnesota | NELAC | 5 | 050-999-436 |
| TestAmerica Burlington | New Hampshire | NELAC | 1 | 200610 |
| TestAmerica Burlington | New Jersey | NELAC Primary AB | 2 | VT972 |
| TestAmerica Burlington | New York | NELAC | 2 | 10391 |
| TestAmerica Burlington | Pennsylvania | NELAC | 3 | 68-00489 |
| TestAmerica Burlington | Rhode Island | State Program | 1 | LAO00298 |
| TestAmerica Burlington | USDA | Federal | | P330-11-00093 |
| TestAmerica Burlington | Vermont | State Program | 1 | VT-4000 |
| TestAmerica Burlington | Virginia | NELAC | 3 | 460209 |

Accreditation may not be offered or required for all methods and analytes reported in this package Please contact your project manager for the laboratory's current list of certified methods and analytes.

ATTACHMENT 4: Vapor Intrusion Investigation Concurrence Letter from the EPA



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

May 16, 2013

Mr. Nathan W. Edwards, Chief
Environmental Management Division
Department of the Army
Tobyhanna Army Depot
11 Hap Arnold Boulevard
Tobyhanna, PA 18466-5086

Dear Mr. Edwards:

I am in receipt of and have reviewed the "Final Vapor Intrusion Pathway Study Report for Tobyhanna Operable Unit 1", submitted with your letter dated February 12, 2013. Based on my review of this report, I concur with the Tobyhanna Army Depot's recommendation that the vapor intrusion investigation be closed with no further action. The third round of sampling indicated non-detects for the residence that initially had an elevated level of TCE found on the first floor. Since the basement results were non-detect for TCE in all three rounds, it appears that the elevated level may have been due to a background source within the home. All other comments/issues regarding the toxicity criteria have also been addressed.

Please call or email should you have any question or would like to discuss further.

Sincerely,

A handwritten signature in black ink, which appears to read "Lorie Baker", is written over a horizontal line.

Lorie A. Baker
Remedial Project Manager





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

SEP 25 2012

Mr. Nathan Edwards
Chief, Environmental Management Division
Department of the Army
Tobyhanna Army Depot
11 Hap Arnold Boulevard
Tobyhanna, PA 18466-5086

Subject: Five-Year CERCLA Review of the Tobyhanna Army Depot, Tobyhanna, Pennsylvania

Dear Mr. Edwards:

Thank you for submitting the Five-Year Review report entitled: Third Five-Year Review Report Tobyhanna Army Depot, Tobyhanna, Pennsylvania, dated September 2012. The purpose of this letter is to provide concurrence on the above-referenced report.

As you know, Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at a site above levels that allow for unlimited use and unrestricted exposure be subject to a five-year review (5YR).

There are currently three Operable Units (OUs) at the Tobyhanna Army Depot that require a 5YR protectiveness determination and are therefore addressed in this 5YR. Summaries for these OUs are provided below for documentation purposes, along with a discussion of any issues EPA or the Army has identified that need to be addressed.

OU- 1: Contaminated groundwater attributable to Areas A and B.

Issues: During the second round of vapor sampling there was a detection of TCE on the first floor of one of the residences. The basement had no detection of TCE. Additional information is necessary to determine whether this release was due to vapor intrusion or to a household source.

It has been 15 years since the MNA remedy was selected, and the Remedial Action Objectives (RAOs) have not yet been achieved.

Recommendations and Follow-up Actions: The Army has recommended that the residence with the elevated level of TCE in air on the first floor be re-sampled. They have also recommended that the MNA remedy for OU-1 be re-evaluated along with the development of an exit strategy to determine when the RAOs have been met before the next Five-Year Review as part of the Annual Performance Evaluations. EPA agrees with these recommendations.

Protectiveness Statement that will be reported to Congress: The remedy at OU-1 is protective in the short-term; however, in order for the remedy to be protective in the long-term, follow-up actions need to be taken.

OU- 4: UXO Area

Issues: No issues

Recommendations and Follow-up Actions: None

Protectiveness Statement that will be reported to Congress: The remedy at OU-4 remains protective of human health and the environment.

OU-5: Groundwater contamination attributable to releases from the Inactive Landfill

Issues: Based on the concentration trends of some of the contaminants of concern, it does not appear that the RAOs will be met in the time frame indicated in the remedy. TCE in particular has increased in concentration in several bedrock wells onsite since 2004. However, the concentrations of TCE and other contaminants found in the off post groundwater monitoring wells that are downgradient of OU-5 continue to be below the MCLs, and there are no receptors in that area so the remedy continues to be protective.

Recommendations and Follow-up Actions: Based on the upward trends observed for the COCs at OU-5, the Army recommends that the MNA remedy for OU-5 be re-evaluated before the next Five-Year Review as part of the Annual Performance Evaluations. EPA agrees with this recommendation.

Protectiveness Statement that will be reported to Congress: The remedy at OU-5 remains protective of human health and the environment.

The EPA concurs with the Army's protectiveness statements for OU-4 and OU-5. However, recognizing that some additional investigation is necessary to evaluate the elevated level of TCE found in the air in the first floor of one residence, the EPA is recommending revising the protectiveness statement for OU-1 to "Protective in the short-term; however, in order for the remedy to be protective in the long-term, follow-up actions need to be taken.

During the second Five Year Review, EPA evaluated the Government Performance and Results Act (GPRA) measures for TYAD and had determined their status as follows:

Environmental Indicators

Human Health: Under Control
Groundwater Migration: Under control

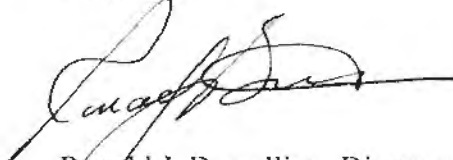
Sitewide Ready for Anticipated Use

The site is Site-Wide Ready for Anticipated Use.

These GPRA measures remain effective for this reporting period. The next Five Year Review will be due on 27 September 2017, five years from the due date of this report.

If you have any questions, please contact Steve Hirsh, Acting Chief of the NPL/BRAC Federal Facilities Branch at 215-814-3351 or Lorie Baker at 215-814-3355.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ronald J. Borsellino', with a long horizontal flourish extending to the right.

Ronald J. Borsellino, Director
Hazardous Site Cleanup Division

cc: Robert Lewis, Pennsylvania Department of Environmental Protection



Third Five-Year Report For

Operable Unit 1 (Areas A and B),
Operable Unit 4 and
Operable Unit 5
Tobyhanna Army Depot

Final

Delivery Order 0030

Contract Number W912DR-09-D-0015

September 2012

Prepared for:

TOBYHANNA
ARMY DEPOT ENVIRONMENTAL
EXCELLENCE

Tobyhanna Army Depot
Tobyhanna, Pennsylvania

Prepared by:



Weston Solutions, Inc.
West Chester,
Pennsylvania 19380

FINAL

FIVE-YEAR REVIEW REPORT

**THIRD FIVE-YEAR REVIEW REPORT
FOR
TOBYHANNA ARMY DEPOT
TOBYHANNA, PENNSYLVANIA
OPERABLE UNIT 1 (AREAS A AND B), OPERABLE UNIT 4 AND
OPERABLE UNIT 5**

Contract No. W912DR-09-D-0015
Delivery Order No. 0030

Prepared for:

**U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT**
Baltimore, Maryland

September 2012

Prepared by:

WESTON SOLUTIONS, INC.
West Chester, Pennsylvania

W.O. No. 03886.550.030.5000

FINAL

FIVE-YEAR REVIEW REPORT

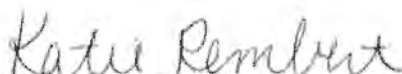
**THIRD FIVE-YEAR REVIEW REPORT
FOR
TOBYHANNA ARMY DEPOT
TOBYHANNA, PENNSYLVANIA
OPERABLE UNIT 1 (AREAS A AND B), OPERABLE UNIT 4 AND
OPERABLE UNIT 5**

Prepared for:

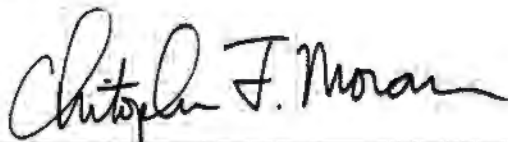
**U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT**
Baltimore, Maryland

Prepared by:

WESTON SOLUTIONS, INC.
West Chester, Pennsylvania



Katie Rembert
Project Scientist



Christopher F. Moran
Senior Project Manager

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LIST OF ACRONYMS

| | |
|-----------------|---|
| µg/L | micrograms per liter |
| AOC | Area of Concern |
| ARAR | applicable or relevant and appropriate requirement |
| Army | U.S. Army |
| BMCL | below MCL |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COCs | contaminants of concern |
| DoD | U.S. Department of Defense |
| EMD | Environmental Management Division |
| EOD | explosive ordnance disposal |
| EPA | U.S. Environmental Protection Agency |
| FFA | Federal Facility Agreement |
| FS | Feasibility Study |
| ft | feet |
| FY | fiscal year |
| HA | hazard assessment |
| HE | high explosive |
| ICs | institutional controls |
| IIA | Initial Installation Assessment |
| IRP | Installation Restoration Program |
| LFWSP | Landfill Well Sampling Program |
| MCL | Maximum Contaminant Level |
| MD | munitions debris |
| MEC | munitions and explosives of concern |
| mi ² | square miles |
| MK | Mann-Kendall trend analysis |
| mm | millimeter |
| MMRP | Military Munitions Response Program |
| MNA | monitored natural attenuation |
| MRS | munitions response site |
| MWSP | Monitor Residential Well Sampling Program |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| ND | no detections |
| NFA | no further action |

LIST OF ACRONYMS (CONTINUED)

| | |
|---------------------|---|
| NPL | National Priorities List |
| NS | not sampled |
| O&M | operations and maintenance |
| OLS | ordinary least squares |
| OSWER | Office of Solid Waste and Emergency Response |
| OU | Operable Unit |
| PADEP | Pennsylvania Department of Environmental Protection |
| PADER | Pennsylvania Department of Environmental Resources |
| PCE | tetrachloroethene |
| ppb | parts per billion |
| PVC | polyvinyl chloride |
| RAB | Restoration Advisory Board |
| RAO | Remedial Action Objective |
| RCRA | Resource Conservation and Recovery Act |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| RSL | regional screening level |
| SDWA | Safe Drinking Water Act |
| SVOC | semivolatile organic compound |
| SWMU | Solid Waste Management Unit |
| TAL | target analyte list |
| TBC | To Be Considered criteria |
| TCE | trichloroethene |
| TCL | Target Compound List |
| TYAD | Tobyhanna Army Depot |
| USACE | U.S. Army Corps of Engineers |
| USAEC | U. S. Army Environmental Center |
| UU/UE | unlimited use and unrestricted exposure |
| UXO | unexploded ordnance |
| VC | vinyl chloride |
| VI | vapor intrusion |
| VIP | vapor intrusion pathway |
| VOC | volatile organic compound |
| yd ³ | cubic yards |
| WESTON [®] | Weston Solutions, Inc. |

EXECUTIVE SUMMARY

The U.S. Army (Army), as the lead agency, with review and input from the U.S. Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Protection (PADEP), has conducted a Five-Year (statutory) Review of the remedial actions implemented for Operable Unit (OU) 1 (Areas A and B), OU-4, and OU-5 at the Tobyhanna Army Depot (TYAD), Pennsylvania. This report summarizes the results of the third Five-Year Review of the TYAD National Priorities List (NPL) sites, which was conducted from March 2012 to April 2012. The trigger for this Five-Year Review was the execution of the second Five-Year Review for the TYAD NPL sites, for which EPA concurrence was received in September 2007.

The selected remedy for OU-1, as documented in the Record of Decision (ROD), September 1997, was Natural Attenuation/Long-Term Monitoring/Institutional Controls for groundwater and no further action for soils, as the Army had previously conducted a Removal Action in July 1995 and removed approximately 2,100 cubic yards (yd³) of volatile organic compound (VOC)-contaminated soils. The remedy was implemented beginning in 1998. As part of the long-term monitoring, groundwater samples were collected twice per year through October 2006 under the Monitor/Residential Well Sampling Program and analyzed for VOCs. Since May 2007, only annual sampling was required, as concurred with by EPA and PADEP. Institutional controls include an agreement with Coolbaugh Township to notify TYAD of any new construction that will require potable water and an update to the TYAD Master Plan to prohibit the construction of new drinking water wells in OU-1.

Institutional controls implemented by prior removal actions were selected and expanded on in the ROD completed for OU-4, the Powder Smoke Ridge Unexploded Ordnance (UXO) Area, in September 2000. The institutional controls described in the ROD for OU-4 include the following components: 1) Physical Controls (i.e., fencing and gates); 2) Security Patrols/Monitoring; 3) UXO Avoidance Support; 4) Proprietary Controls; 5) Public/Employee Education; and 6) Periodic (Five-Year) Review.

The selected remedy for the OU-5 inactive sanitary landfill, as documented in the ROD, September 2000, was Monitored Natural Attenuation/Institutional Controls (MNA/ICs). The remedy was implemented beginning in 2000. As part of the monitoring, groundwater samples were collected twice per year through October 2006 under the Landfill Well Sampling Program

FINAL

and analyzed for VOCs, semivolatile organic compounds (SVOCs) and metals. Since May 2007, only annual sampling is required as concurred with by EPA and PADEP. Institutional controls include the following: 1) an agreement with Coolbaugh Township to notify TYAD of any new construction that will require potable water, which ensures that new wells are not placed in areas of known or suspected contamination; 2) TYAD Master Plan prohibition of any on-post drinking water well construction in the area of OU-5; 3) ongoing public education regarding potential hazards associated with consumption of contaminated groundwater in OU-5; and 4) results of long-term monitoring presented to all TYAD employees in articles in the installation newspaper.

Issues and recommendations identified as a result of this Five-Year Review for OU-1, OU-4, and OU-5 consist of the following:

- OU-1: TYAD needs to re-establish rights of entry for property R1-94 with the new owners. It is critical to sample the property to develop complete and accurate contaminant plume maps. Rights of entry will be re-established by fall 2012.
- OU-1: A vapor intrusion investigation is ongoing at OU-1. During the second round of sampling there was a detection of TCE on the first floor of one of the residences. This first floor location will be sampled again in the fall of 2012 to confirm that the high levels of TCE were the result of a household source rather than from contamination at OU-1. The results of this sampling and the comments from the regulatory review of the Draft Vapor Intrusion Pathway (VIP) Study Report for Tobyhanna Operable Unit 1 (Weston, 2012) will be put into a final report which will be completed by the 4th quarter 2012. Current data shows that VIP is not affecting the protectiveness of the remedy for OU-1.
- OU-1: A clear, well-defined exit strategy for groundwater monitoring at OU-1 has not been developed. There are no criteria for demonstrating that the contaminants of concern (COCs) have permanently decreased to concentrations less than the performance standards for the remedial action. Criteria will be developed as part of the upcoming Annual Performance Evaluations of the remedy for OU-1.
- OU-1: It has been 15 years since the monitored natural attenuation (MNA) remedy was selected and the Remedial Action Objectives (RAOs) have not been achieved for all COCs. The MNA remedy for OU-1 will be re-evaluated before the next Five-Year Review in conjunction with the Annual Performance Evaluations.
- OU-5: In 2004 there was a spike of TCE groundwater concentrations in several bedrock wells at OU-5. This spike was potentially due to new sampling methods initiated in 2004 or high groundwater levels in 2004 that might have contacted landfill materials. However, the concentrations of TCE found in the off post groundwater monitoring wells that are downgradient of OU-5 are well below the MCL. So the contamination from this site is still contained within TYAD. TYAD will investigate OU-5 to determine what is causing the levels of TCE to increase as part of the upcoming Annual Performance Evaluations of the remedy for OU-5.

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- OU-5: Based on the upward trends observed for the COCs at OU-5, the RAOs may not be met within the estimated timeframe. Therefore, the MNA remedy for OU-5 will be re-evaluated before the next Five-Year Review in conjunction with the Annual Performance Evaluations.

These issues, in the short term, do not impact the protectiveness of the remedies for OU-1, OU-4, or OU-5 under current conditions. The remedies for OUs 1, 4, and 5 are protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled.

TYAD is a statutory site that requires ongoing Five-Year Reviews. The initial trigger date for the first TYAD Five-Year Review was 30 September 1997. The first evaluation for the TYAD NPL Site was signed by the Army and concurred with by EPA in September 2002. The second Five-Year Review for the TYAD NPL Site was signed by the Army and concurred with by EPA in September 2007.

The EPA Memorandum, *Program Priorities for Federal Facility Five-Year Review*, issued August 1, 2011, has altered the requirement for due dates of subsequent Five-Year Reviews. The Memorandum states the following in regard to due dates:

In fiscal year (FY) 2011, [the Federal Facilities Restoration and Reuse Office] has made a [Comprehensive Environmental Response, Compensation, and Liability Information System] change such that the future date will be based on the planned completion date. What this means is that starting this fiscal year, if the date the five-year review report is concurred on by EPA is July 30, 2011, then the due dates of the subsequent five year reviews are July 30, 2016 and July 30, 2021. This will assure that the due dates do not change if the reports are late or early. These changes supersede section 1.3.3 of the 2001 Comprehensive Five-Year Review Guidance for federal facilities.

Therefore, the next Five-Year Review for the TYAD NPL site will be completed no later than 5 years after the due date of this Five-Year Review, which will be 27 September 2017. This is in compliance with Army and EPA policy.

Five-Year Review Summary Form

| SITE IDENTIFICATION | | |
|---|---|---------------------|
| Site Name: Tobyhanna Army Depot | | |
| EPA ID: PA5213820892 | | |
| Region: 3 | State: PA | City/County: Monroe |
| SITE STATUS | | |
| NPL Status: Final | | |
| Multiple OUs? Yes | Has the site achieved construction completion? Yes | |
| REVIEW STATUS | | |
| Lead agency: Other Federal Agency If "Other Federal Agency" was selected above, enter Agency name: U.S. Army | | |
| Author name (Federal or State Project Manager): Jaroslav Sebek | | |
| Author affiliation: Environmental Management Division, Tobyhanna Army Depot | | |
| Review period: 03/2012 – 06/2012 | | |
| Date of site inspection: 3/22/2012 | | |
| Type of review: Statutory | | |
| Review number: 3 | | |
| Triggering action date: 09/27/2007 | | |
| Due date (five years after triggering action date): 09/27/2012 | | |

The table below is for the purpose of the summary form and associated data entry and does not replace the two tables required in Section VIII and IX by the Five-Year Review guidance. Instead, data entry in this section should match information in Section VII and IX of the Five-Year review report.

FINAL
Five-Year Review Summary Form (Continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:

OU-4

Issues and Recommendations Identified in the Five-Year Review:

| | | | | |
|--------------------------------------|--|---------------------------|------------------------|-----------------------|
| OU(s): OU-1 | Issue Category: Site Access/Security | | | |
| | Issue: OU-1: Rights of entry for property R1-94. TYAD needs to re-establish rights of entry for property R1-94 with the new owners. This is a critical property at which to sample in order to develop complete and accurate contaminant plume maps | | | |
| | Recommendation: Re-establish rights of entry for property R1-94 with the new owners. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
| No | No | Federal Facility | EPA/State | Fall 2012 |
| OU(s): OU-1 | Issue Category: Remedy Performance | | | |
| | Issue: Vapor intrusion pathway study comments. Vapor intrusion was identified by EPA as an issue that needed to be addressed in the 2012 Five-Year Review. A vapor intrusion investigation is ongoing at OU-1. The vapor intrusion investigation has recently been completed and the Draft Vapor Intrusion Pathway Study Report for Tobyhanna Operable Unit 1 (WESTON, 2012) is currently under review by PADEP and EPA. The draft data show that VIP is not affecting the protectiveness of the remedy for OU-1. | | | |
| | Recommendation: Resolve any issues identified by EPA and PADEP then finalize the <i>Vapor Intrusion Pathway Study Report for Tobyhanna Operable Unit 1</i> (WESTON, 2012). | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
| No | No | Federal Facility | EPA/State | 4th Quarter 2012 |
| OU(s): OU-1 | Issue Category: Monitoring | | | |
| | Issue: Vapor detection at residence R1-111. During the second round of vapor sampling there was a detection of TCE on the first floor of one of the residences that exceeded the EPA regional screening level (RSL). | | | |

FINAL
Five-Year Review Summary Form (Continued)

| | | | | |
|--------------------------------------|--|---------------------------|------------------------|-----------------------|
| | Recommendation: The first floor location will be sampled again in the fall of 2012 to confirm that the detection of TCE was the result of a household source rather than from contamination at OU-1. The results of this sampling will be put into the VIP report which will be finalized by the 4th quarter 2012. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
| No | No | Federal Facility | EPA/State | 4th Quarter 2012 |
| OU(s): OU-1 | Issue Category: Monitoring | | | |
| | Issue: Exit Strategy for Groundwater Monitoring. A clear, well-defined exit strategy for groundwater monitoring at OU-1 has not been developed. There are no criteria for demonstrating that the contaminants of concern (COCs) have permanently decreased to concentrations less than the performance standards for the remedial actions. | | | |
| | Recommendation: Develop exit strategy criteria to remove wells and analytes from the monitoring program as part of the next (2012) Annual Performance Evaluation of the remedy for OU-1. Re-evaluate the MNA remedy for OU-1 in conjunction with the Annual Performance Evaluations. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
| No | No | Federal Facility | EPA/State | 1st Quarter 2014 |
| OU(s): OU-1 | Issue Category: Remedy Performance | | | |
| | Issue: Re-evaluate MNA remedy. It has been 15 years since the MNA remedy was selected and the RAOs have not been achieved. | | | |
| | Recommendation: The MNA remedy for OU-1 should be re-evaluated before the next Five-Year Review as part of the Annual Performance Evaluations. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
| No | Yes | Federal Facility | EPA/State | September 2017 |
| OU(s): OU-5 | Issue Category: Remedy Performance | | | |
| | Issue: Increasing TCE concentrations. In 2004 there was a spike of TCE in the groundwater in several bedrock wells at OU-5. However, the concentrations of TCE found in the off post groundwater monitoring wells that are downgradient of OU-5 are well below the MCL. So the contamination from this site is still contained within TYAD. | | | |
| | Recommendation: TYAD will investigate OU-5 to determine what is causing the levels of TCE to increase as part of the next (2012) Annual Performance Evaluation of the remedy for OU-5. Re-evaluate the MNA remedy for OU-5 in conjunction with the Annual Performance Evaluations. | | | |

FINAL
Five-Year Review Summary Form (Continued)

| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
|-------------------------------|---|--------------------|-----------------|------------------|
| No | Yes | Federal Facility | EPA/State | 1st Quarter 2013 |
| OU(s): OU-5 | Issue Category: Remedy Performance | | | |
| | Issue: Re-evaluate MNA remedy. Based on the upward trends observed for the COCs at OU-5, the RAOs may not be met within the estimated timeframe. | | | |
| | Recommendation: The MNA remedy for OU-5 should be re-evaluated before the next Five-Year Review as part of the Annual Performance Evaluations. | | | |
| Affect Current Protectiveness | Affect Future Protectiveness | Implementing Party | Oversight Party | Milestone Date |
| No | Yes | Federal Facility | EPA/State | September 2017 |

To add additional issues/recommendations here, copy and paste the above table as many times as necessary to document all issues/recommendations identified in the Five-Year Review report.

FINAL
Five-Year Review Summary Form (Continued)

Protectiveness Statement(s)

Include each individual OU protectiveness determination and statement. If you need to add more protectiveness determinations and statements for additional OUs, copy and paste the table below as many times as necessary to complete for each OU evaluated in the Five-Year Review report.

Operable Unit:
OU-1

Protectiveness Determination:
Protective

*Addendum Due Date
(if applicable):*
[Click here to enter date.](#)

Protectiveness Statement:

The remedy at OU-1 (Natural Attenuation/Long-Term Monitoring/Institutional controls) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled.

Operable Unit:
OU-4

Protectiveness Determination:
Protective

*Addendum Due Date
(if applicable):*
[Click here to enter date.](#)

Protectiveness Statement:

The remedy at OU-4 (Institutional controls) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled.

Operable Unit:
OU-5

Protectiveness Determination:
Protective

*Addendum Due Date
(if applicable):*
[Click here to enter date.](#)

Protectiveness Statement:

The remedy at OU-5 (Natural Attenuation/Long-Term Monitoring/Institutional controls) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled.

Sitewide Protectiveness Statement (if applicable)

For sites that have achieved construction completion, enter a sitewide protectiveness determination and statement.

Protectiveness Determination:
Protective

Addendum Due Date (if applicable):
N/A

Protectiveness Statement:

The remedies for OUs 1, 4, and 5 are functioning as designed, are protective of human health and the environment, and are being operated and maintained in an appropriate manner.

1. INTRODUCTION

The U.S. Army (Army), as the lead agency, with review and input from the U.S. Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Protection (PADEP), has conducted a Five-Year (statutory) Review of the remedial actions implemented for Operable Unit (OU) 1 (Areas A and B), OU-4, and OU-5 at the Tobyhanna Army Depot (TYAD), Pennsylvania. This report summarizes the results of the third Five-Year Review of the TYAD National Priorities List (NPL) sites, which was conducted from March 2012 to April 2012. The trigger for this Five-Year Review was the execution of the second Five-Year Review for the TYAD NPL sites, for which EPA concurrence was received in September 2007.

This Five-Year Review is necessary due to the presence of contaminants at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE). The purpose of Five-Year Reviews is to determine whether the remedies selected for implementation in the RODs for a site remain protective of human health and the environment. The methods, findings, and conclusions of Five-Year Reviews are documented in Five-Year Review reports, which identify issues found during the review, if any, and recommendations to address them.

The U.S. Army, the lead agency for TYAD, is preparing this Five-Year Review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (NCP; 40 Code of Federal Regulations [CFR] Part 300). CERCLA 121(c), as amended, states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

This requirement was interpreted further in the NCP (40 Code of Federal Regulations [CFR] 300.430(f)(4)(ii)), which states:

FINAL

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the third Five-Year Review for OU-1, OU-4, and OU-5 at TYAD. The decision documents for each OU are summarized below.

- *Record of Decision, Operable Unit 1 (Areas A and B)* (U.S. Army Environmental Center [USAEC], 1997) – Specifies Natural Attenuation/Long-Term Monitoring/Institutional Controls as the selected alternative for OU-1 (Areas A and B) to minimize the threat of migration of contaminants in the groundwater at TYAD and adjacent off-post areas. The Institutional Controls include an agreement with the Coolbaugh Township Zoning Office concerning notification of new construction (i.e., water service) in the OU-1 area and an update to the TYAD Master Plan to prohibit the construction of new drinking water wells in OU-1.
- *Record of Decision, Operable Unit 4* (USAEC, 2000) – Specifies Institutional Controls as the selected alternative for OU-4 (the Powder Smoke Ridge Unexploded Ordnance [UXO] Area) to minimize the threat of unauthorized personnel entering this area. Institutional Controls include fencing, warning signs, security patrols, UXO avoidance support and public education.
- *Record of Decision, Operable Unit 5* (USAEC, 2000) – Specifies Natural Attenuation/Long-Term Monitoring/Institutional Controls as the selected alternative for OU-5 (the Inactive Sanitary Landfill) to minimize the threat of migration of contaminants in the groundwater at TYAD. The Institutional Controls include an agreement with the Coolbaugh Township Zoning Office concerning notification of new construction (i.e., water service) in the OU-5 area and an update to the TYAD Master Plan to prohibit the construction of new drinking water wells in OU-5.

A review of OU-1 (Areas A and B), OU-4, and OU-5 every five years after commencement of a remedial action is a statutory requirement, while contaminants remain above cleanup goals, based upon the original RODs, finalized in September 1997 for OU-1 and September 2000 for OU-4, and OU-5. The following documents were used in the development of this review:

- Environmental Protection Agency (EPA), Comprehensive Five-Year Review Guidance, Office of Solid Waste and Emergency Response (OSWER) 9355.7-03B-P, June 2001.
- EPA, Recommended Evaluation of Institutional Controls: Supplement to the Comprehensive Five-Year Review Guidance, OSWER 9355.7-18, September 2011.
- EPA, Five-Year Review Summary Form Template, December 2011.

2. SITE CHRONOLOGY

A chronology of the TYAD site is provided in **Table 2-1**. A more detailed description of the remedial actions conducted at TYAD is provided in Section 4 of this report.

Table 2-1 TYAD OU-1, OU-4, and OU-5 Site Activity

| Date | Associated OU(s) | Site Activity |
|----------------|------------------|--|
| 1979 | TYAD | TYAD initiates Discovery Phase of the Installation Restoration Program (IRP). |
| 1981 | OU-1 | Volatile organic compounds (VOCs) discovered in on-post drinking water supply well (ON-3) and nearby residential wells at levels not exceeding the Pennsylvania Department of Environmental Resources (PADER's) 1981 drinking water standards; activated carbon groundwater treatment system installed to remove VOCs from drinking water; residents notified. |
| 1986 | OU-1 | Groundwater sampling by the Monroe County Planning Commission and PADER indicates TCE in residential wells at levels exceeding the revised 1986 maximum contaminant level (MCL) as promulgated under the Safe Drinking Water Act (SDWA). |
| March 1987 | OU-1 | Army supplies bottled water to affected residences and businesses. |
| September 1987 | OU-1 | Army initiates the Remedial Investigation (RI)/Feasibility Study (FS) to determine and characterize the source of VOCs in the groundwater. |
| 1988 | OU-5 | Semi-annual sampling of on-post supply and monitoring wells, as well as off-post residential wells, begins; RI conducted to further characterize OU-5. |
| 1989 | OU-1 | In 1989, the activated carbon groundwater treatment system for ON-3 was replaced with an air stripper treatment system. |
| August 1990 | TYAD | TYAD added to National Priorities List (NPL) |
| November 1990 | TYAD | EPA signs a Federal Facility Agreement (FFA) with the Army to investigate environmental impacts of past and present activities at TYAD. |
| 1991 | OU-1 | Army installs potable waterline from TYAD to 23 affected residences/businesses. |
| December 1992 | OU-1 | Army submits final FS for OU-1. |
| July 1995 | OU-1 | Army conducts Removal Action and removes approximately 2,100 cubic yards (yd ³) of VOC-contaminated soil from OU-1. |
| 1995 | OU-5 | New RI conducted for OU-5 |

Table 2-1
TYAD OU-1, OU-4, and OU-5 Site Activity (Continued)

| Date | Associated OU(s) | Site Activity |
|-----------------|------------------------|--|
| September 1997 | OU-1 | Record of Decision (ROD) for OU-1 finalized. |
| June 2000 | OU-4 | TYAD performs CERCLA removal action at OU-4 and installs barbed-wire fence and warning signs around perimeter of UXO area. |
| September 2000 | OU-4/ OU-5 | RODs for OU-4 and OU-5 finalized. |
| 1998-2002 | OU-1/ OU-5 | Semi-annual sampling of on-post supply and monitoring wells, off-post residential wells, and landfill wells on and off-post. |
| September 2002 | OU-1/ OU-4/ OU-5 | First Five-Year Review finalized. |
| 2003 | OU-4 | New barbed wire fence was installed around OU-4 from Route 423 to the top of Powder Smoke Ridge, where it ties into the existing barbed wire fence. Now, the fence extends from the road, along TYAD property, to the top of the ridge. |
| May – July 2004 | OU-4 | UXO clearance and avoidance operations were conducted inside the southern boundary of OU-4 in support of design activities for a proposed Training and Conference Center to be located between Perimeter Road and OU-4. UXO Technicians investigated and cleared UXO from the 4-acre site down to a depth of 2 feet. |
| June 2004 | OU-4 | UXO support was required for UXO avoidance and surface removal support conducted during June 2004 prior to tree clearing operations outside the perimeter fence at the Air Defense Radar Facility located within OU-4. |
| September 2004 | OU-4 | UXO support was required for site inspection soil sampling conducted at ten locations during September 2004. |
| 2005 | OU-4 | The Military Munitions Response Program (MMRP) Final Site Inspection Report (Malcom Pirnie, 2005) recommended that the perimeter of OU-4 be expanded to include 42 acres of a former artillery range fan at the southeast corner of OU-4 – roughly located between Ridge Road and the Depot boundary. The new fencing was installed. |
| April 2005 | OU-5 | The Environmental Management Division (EMD) observed that the protective casings and concrete pads around several of the TYAD landfill monitoring wells (outside the landfill cells) were suspended above the ground surface due to frost heave. |
| September 2005 | OU-4 | An approximately 2,000 foot section of new barbed wire perimeter fence was installed around the expanded perimeter of OU-4 and warning signs were posted on the fence. The fence and several gates were installed on the northeast side of the main parking lot and Hap Arnold Boulevard extending from Powder |

Table 2-1
TYAD OU-1, OU-4, and OU-5 Site Activity (Continued)

| Date | Associated OU(s) | Site Activity |
|-----------------------|------------------------|--|
| | | Smoke Ridge Road to near Building 310. UXO support was conducted on September 1, 2005, prior to the installation of the new OU-4 perimeter fence posts. |
| 2002-2006 | OU-1/ OU-5 | Semi-annual sampling of on-post supply and monitoring wells, off-post residential wells, and landfill wells on and off-post. |
| May 2006 | OU-5 | Prudent Engineering re-surveyed the elevations of the tops of the polyvinyl chloride (PVC) well casings, tops of the protective casings, tops of the cement pads and the ground surface for seven landfill wells. |
| November 2006 | OU-5 | Well surface repairs were conducted for 15 landfill wells. In addition to the rehabilitation/repairs that were done, eight monitoring wells at the landfill site were abandoned. |
| May 2007 | OU-1/ OU-5 | Began annual sampling of on-post supply and monitoring wells, off-post residential wells and landfill wells on and off-post. Starting in 2008, the annual sampling has been conducted in the fall months. |
| 2008 | OU-4 | Approximately 100 ft of damaged perimeter fence around OU-4, caused by fallen trees, was repaired. |
| September 2007 | OU-1/ OU-4/ OU-5 | Second Five-Year Review finalized. |
| April – November 2008 | OU-4 | To prepare for the construction of a new radar site in OU-4, a subsurface UXO removal was conducted for the 8-acre Barstow radar construction area and a surface UXO clearance was conducted for the remaining 21 acres. |
| April - October 2009 | OU-4 | A munitions and explosives of concern (MEC) removal action was conducted in OU-4 at the new Seal Beach Radar Construction Site. A subsurface MEC clearance was conducted at the 2-acre radar construction site and a surface clearance was conducted across the remaining 20 acres. |
| April – May 2010 | OU-4 | A MEC surface clearance and tree/brush clearing were conducted along both sides of the perimeter fence along the northern, eastern and western boundary of OU-4. All brush, saplings, and trees along the 1.75 miles of fence line were felled and chipped out to six feet on either side of the fence and to a height of 12 feet from ground. |
| April 2010 | OU-4 | A MEC investigation was conducted at both the Barstow and Seal Beach Radar Construction Sites during 2010. In preparation for the radar construction work, a MEC surface sweep was conducted across the entire limits of the Barstow and Seal Beach Radar Construction Sites beginning on 19 April 2010. |
| April 2010 | OU-5 | By mistake, 12 stakes and 2 grounding rods (3 feet long) were |

Table 2-1
TYAD OU-1, OU-4, and OU-5 Site Activity (Continued)

| Date | Associated OU(s) | Site Activity |
|-------------------------|------------------|--|
| | | driven into the sanitary landfill cap (OU-5, Cell B) to support a tripod stand for some electronics test equipment - without authorization. Once the EMD became aware of the testing on the landfill cap, the stakes and rods were removed and the 1" diameter holes were repaired. On April 23, 2010, the holes were tightly packed with bentonite clay chips and hydrated to seal the holes. |
| July – October 2010 | OU-5 | During the preliminary earth moving operations for the Barstow and Seal Beach radar construction, UXO avoidance support was provided for the radar construction contractor because some of the excavation work was below the depth of the previous MEC Removal Actions. No additional MEC were located during the limits UXO avoidance support at either radar site. |
| August – September 2010 | OU-1 | Four groundwater wells, PW-1, OW-1, MW-03 and MW-15, were abandoned because they were located within the construction footprint of three new office buildings along Corporal Damato Street. These buildings are being built within the footprint of Area A in OU-1. None of these wells were part of the current groundwater monitoring network for OU-1, Area A. |
| March 2011 | OU-1 | Conducted the first round of vapor intrusion pathway (VIP) sampling at four residences in OU-1. |
| December 2011 | OU-1 | Conducted the second round of VIP sampling at four residences in OU-1. |
| August 2011 | OU-4 | In preparation for fence installation work at OU-4, UXO Technicians conducted a MEC surface sweep across the proposed fence line perimeter of the Barstow and Seal Beach Radar Construction Sites on 22 August 2011. |
| August – September 2011 | OU-4 | Approximately 3,000 feet of 5-strand barbed wire fence and UXO warning signs were installed in OU-4 between 22 August and 13 September 2011 to fence off the perimeter of the two new radar sites and safeguard the radar workers. |

3. BACKGROUND

3.1 LAND AND RESOURCE USE

The TYAD facility is located in the Pocono Mountains of Monroe County, Pennsylvania, approximately 15 miles southeast of Scranton, adjacent to the Village of Tobyhanna. The facility comprises approximately 2.2 square miles (mi²). TYAD is bordered to the north, east, and west by the Tobyhanna State Park Reserve and to the south by the Village of Tobyhanna. Land use in the area surrounding the depot is a broad mix of light industry, residential, and recreational uses. Residential areas exist within 200 feet (ft) of the installation to the south, southeast, and east. A site location map is presented in **Figure 3-1**.

Currently, TYAD is the largest full-service electronics maintenance facility in the Department of Defense (DoD). TYAD's mission is total sustainment, including design, manufacture, repair and overhaul, of electronic systems. Systems include satellite terminals, radio and radar systems, telephones, electro-optics, night vision and anti-intrusion devices, airborne surveillance equipment, navigational instruments, electronic warfare, and guidance and control systems for tactical missiles. TYAD is the DoD's recognized leader in the areas of automated test equipment, systems integration, and downsizing of electronics systems. Since its activation, TYAD has been a government-owned, government-operated facility. No industrial leases have existed at TYAD.

OU-1 is comprised of two distinct areas, Areas A and B. Area A consists of former burning and disposal areas, which were actively used from the 1950s to the early 1960s. Area B is near the southeastern corner of TYAD and consists of a former drum staging area, which was used for temporary storage and disposal of building materials and other wastes during the construction of the existing facility. The locations of Areas A and B are presented in **Figure 3-2**.

OU-4 comprises approximately 584 acres of a former artillery range that was used by the Army and National Guard for artillery practice and machine gun training during World Wars I and II. The location of OU-4 is presented in **Figure 3-3**. The former Tobyhanna Artillery Range (TOAR) comprises a total of approximately 21,100 acres, consisting of firing points and impact areas. Currently, the former site is subdivided into Pennsylvania State Parks, Pennsylvania

Game Commission land, Coolbaugh Township Municipal Park, and the TYAD, where OU-4 is located.

U.S. Army Corps of Engineers (USACE) is currently performing a Munitions and Explosives of Concern (MEC) Remedial Action of Munitions Response Sites (MRS)-R02, R03, R04 and R05 at the former TOAR located in Tobyhanna and Gouldsboro State Parks and State Game Lands 127 in Monroe and Wayne Counties, Pennsylvania. The MEC Remedial Action is being conducted to minimize or eliminate the explosive safety risk to the public and personnel by removal of UXO to detection depth and implementing Land Use Controls (LUCs). The MEC Remedial Action is being conducted outside of TYAD, but several of the MRS (MRS-R02B and -R02C) are located along the northeast border of TYAD near OU-4 (see **Appendix C, Figure C-7**). Most of the MEC Remedial Action was completed at MRS-R02B and MRS-R02B during 2011.

OU-5 is defined as groundwater impacted by the Inactive Sanitary Landfill that was operated from 1963 to 1979. The landfill is located along the western border of the installation and encompasses an area of approximately 30 acres, as shown in **Figures 3-4 and 3-5**. Operations pertaining to the landfill ceased as of 1 July 1979, and the landfill was closed following closure plans approved by PADEP, formerly the Pennsylvania Department of Environmental Resources (PADER), and EPA in accordance with the Resource Conservation and Recovery Act (RCRA). During the landfill closure process, an approved engineered clay cover was constructed and a surface drainage feature that traversed the landfill from north to south was replaced by a storm drainage system. The original surface water drainage system was filled in and leveled.

3.2 PHYSICAL CHARACTERISTICS

3.2.1 Topography

TYAD lies in the southern New York section of the Appalachian Plateau Physiographic Province. The section is characterized by mature glaciated plateaus of moderate relief with broad intervening lowlands. Within TYAD, the relief varies over a range of approximately 220 ft. The lowest elevation (1,930 ft) occurs south of Barney's lake, while the highest elevation (2,150 ft) occurs on Powder Smoke Ridge.

3.2.2 Hydrogeology

There are two predominant geologic formations found under TYAD: shallow glacial till, and consolidated bedrock. The glacial till is comprised of cobbles and boulders interspersed with varying amounts of sand and clay. There is considerable variation in thickness of glacial till material and depth to the bedrock, but the average thickness of the glacial till material is approximately 20 to 30 ft. The sandstones of the Catskill Formation of the Upper Devonian age dominate the bedrock underlying TYAD. The bedrock consists of fine to medium-grained gray sandstones, which is well-indurated and quartzitic with abundant trough crossbedding.

Groundwater is present in both the glacial till and fractured bedrock aquifers. Water in the glacial till is not used as a source of potable water. Since the glacial till and bedrock aquifers are hydraulically linked, volatile organic compounds (VOCs) in the glacial till can move downward to the bedrock. The presence of fractures strongly influences the groundwater flow through the bedrock aquifer. The consolidated bedrock aquifer serves as the major source of the potable water supply for the depot and surrounding area. The depth to groundwater in the bedrock averages approximately 50 ft.

3.3 HISTORY OF CONTAMINATION

3.3.1 Operable Unit 1

Area A consists of trenches and pits that were excavated and used during the late 1950s and early 1960s for burning waste generated by TYAD. Past operations included trench excavation, waste burning, and in-place burial of ash residue generated from TYAD's heating plant. Specific wastes handled included garbage, construction rubble, scrap metal, drums, and solvents.

Area B consists of a former drum staging area, which was used for temporary storage and disposal of building materials and other wastes during the construction of the existing facility. Three potential areas of contamination were identified during the original investigation at Area B: a large clearing near the middle of the site, a trench containing fragments of rusted drums near the western edge of the site and a pile of debris with additional drum fragments on the ground surface near the southwestern edge of the site.

3.3.2 Operable Unit 4

The Army and National Guard used the former Tobyhanna Artillery Range for artillery practice and machine gun training from 1912 until 1949. OU-4 mainly received 37 and 75 millimeter (mm) ammunition fire from two firing points, one on the southwest end of the depot (Firing Point No. 6) and the other on the northwest side of the depot. Although these two firing points are not part of OU-4, a discussion of the firing points has been included to provide background information related to OU-4.

A Remedial Investigation (RI) was conducted at Firing Point No. 6 at the TYAD Main Gate in December 2011. The current and future land use for this site is to serve as the main gate into TYAD. The purpose of the RI was to investigate the site to determine the nature and extent of UXO at Firing Point No. 6. Results of the RI were used to assess the explosive hazards and human health and ecological risks (WESTON, 2011). No munitions or explosives of concern (MEC) or munitions debris (MD) were identified. The previous Site Inspection (Malcolm Pirnie, 2005) indicated that no explosives were detected in the surface soil at Firing Point No. 6.

A MEC hazard assessment was conducted and a hazard category level of 4 was determined, which means that the site is now considered compatible with current and reasonably anticipated future use. Based on the category level 4 rating determined for the site and because no MEC were identified at the site to a depth of 4 feet below ground surface, a No Further Action (NFA) response has been recommended for Firing Point No. 6.

3.3.3 Operable Unit 5

The sanitary landfill operated from 1963 to 1979 and was reported to have received all types of wastes generated at TYAD, including plating wastes, sludge from the sewage treatment plant, ash from burning of wooden and paper rubble, construction debris, paints, solvents, oils, and sanitary solid waste.

3.3.4 Conceptual Site Model

3.3.4.1 Operable Unit 1

It was determined during the RI and RI Addendum for OU-1 that remediation of the soils at Area A was not necessary because contaminant levels were below cleanup levels. A removal action was completed for soils at Area B.

The contaminants in soils at Areas A and B, primarily solvents, moved downward into the glacial till. Based on the analytical data for bedrock well MW-22 (located at the primary source area), the solvents did not reach the bedrock at Area B. The source of the VOCs detected in groundwater appears to be the remaining solvents trapped in the glacial till (that was not excavated during the soil removal action). As precipitation moves through the glacial till and recharges the groundwater, solvents trapped in the glacial till are dissolving into groundwater and moving down deeper into bedrock or staying in the perched glacial till aquifer. Contaminants of concern (COCs) in groundwater include tetrachloroethene (PCE), trichloroethene (TCE), and their breakdown product vinyl chloride.

Groundwater contamination from Area A does not migrate offsite, while groundwater contamination from Area B does (see **Figures 3-6 and 3-7**). Groundwater flow in the glacial till is westward, away from the residential area (see **Figure 3-8**), as supported by the groundwater analytical results from glacial till well MW-10, which is located between the Area B solvent source area (northwest side of Area B) and bedrock well MW-23. PCE and TCE have not been detected in well MW-10. Groundwater flow in the fractured bedrock moves southeastward under the Village of Tobyhanna toward bedrock well MW-23 and the surrounding residences (see **Figure 3-9**).

The dissolved-phase plume of PCE and TCE exists in the fractured bedrock below the residences and is centered near MW-23, where the highest concentrations of PCE and TCE outside the source area have been detected. The potential exposure pathways for VOCs in groundwater include ingestion, dermal contact, inhalation during nonconsumptive use (e.g., showering, bathing), and inhalation from vapor intrusion (VI).

3.3.4.2 Operable Unit 4

OU-4 is located on Powder Smoke Ridge, which represents the highest elevation at TYAD. The Army and National Guard used the former Tobyhanna Artillery Range for artillery practice and machine gun training from 1912 until 1949. OU-4 comprises approximately 584 acres of the former artillery range and received primarily 37 and 75-mm ammunition fire from two firing points, one on the southwest end of the depot (Firing Point No. 6) and the other on the northwest side of the depot (Firing Point No. 7). The firing points are referred to as “munitions response sites (MRSs)” but are not included in OU-4. Former Target Area No. 5 is located at the top of Powder Smoke Ridge and UXO remains at the surface and in shallow soil on Powder Smoke Ridge within OU-4. In addition to the 37 and 75-mm projectiles, other UXO identified in OU-4 include 155-mm, 3-pounder Navy common, and 60-mm mortar projectiles, plus white phosphorous and FM smoke grenades.

3.3.4.3 Operable Unit 5

The Inactive Sanitary Landfill operated from 1963 to 1979 and was reported to have received all types of wastes generated at TYAD, including: plating wastes, sludge from the sewage treatment plant, ash from burning of wooden and paper rubble, construction debris, paints, solvents, oils and sanitary solid waste. The landfill is located along the western border of the installation and encompasses approximately 30 acres. During the landfill closure process, an approved engineered clay cover was constructed in two areas (Landfill Cells A and B) and a surface drainage feature that traversed the landfill from north to south was replaced by a storm drainage system. The original surface water drainage system was filled in and leveled.

Groundwater contamination at OU-5 results from groundwater contacting landfill materials during periods of high groundwater levels. COCs in OU-5 groundwater include the following:

- Barium
- Arsenic
- Benzene
- Vinyl chloride
- 1,2-Dichloropropane
- Tetrachloroethene
- Trichloroethene

- Pentachlorophenol
- Bis(2-ethylhexyl)phthalate

Groundwater movement in the shallow aquifer appears to be controlled by the morphology of the landfill and the location of the stormwater drainage system (see **Figure 3-10**). Shallow groundwater at the landfill flows to the gravel backfill of the stormwater system. Once the groundwater reaches the gravel backfill, it may flow downgradient along the backfill or may discharge vertically into the bedrock underlying the landfill.

Groundwater movement in the bedrock aquifer is controlled by primary and secondary fractures and along fractures and bedding planes and is unaffected by the presence of the stormwater drainage system. Groundwater elevation data indicate that groundwater movement is to the south, along the axis of the landfill (see **Figure 3-11**).

3.4 INITIAL RESPONSE

3.4.1 Operable Unit 1

In 1979, TYAD initiated the first stage (Discovery Phase) of the Installation Restoration Program (IRP), which consisted of a records search, or Initial Installation Assessment (IIA). Subsequent investigations lead to recommendations to conduct the next phase of the IRP, the Remedial Investigation/Feasibility Study (RI/FS).

VOCs were first discovered at TYAD in 1981 in one of the on-post drinking water supply wells (ON-3). Later in 1981, sampling conducted by PADER (now PADEP) revealed the presence of TCE and PCE in nearby residential wells at levels below the 1981 drinking water standards. Follow-up sampling conducted by Monroe County Planning Commission and PADER in 1986 revealed similar findings and also indicated that certain wells contained TCE levels exceeding the revised 1986 federal drinking water Maximum Contaminant Level (MCL) of 5 parts per billion (ppb) as promulgated under the Safe Drinking Water Act (SDWA).

The Army initiated the RI/FS at TYAD in September 1987 to determine and characterize the source(s) of the VOCs in the groundwater underlying TYAD and a portion of the Village of Tobyhanna. The RI identified two areas at TYAD (Areas A and B) to be the likely source of the

VOCs in the groundwater. Subsequent investigations indicated that groundwater from Area A had not migrated beyond the installation boundary, so Area B contained the source of VOCs found in off-post residential wells.

In August 1990 TYAD was added to the NPL. In November 1990, EPA signed a Federal Facility Agreement (FFA) with the Army to investigate the environmental impacts associated with past and present activities at TYAD and to take appropriate remedial actions as necessary to protect human health and the environment.

In June 1991, the Army installed a potable waterline from TYAD to 23 affected residences/businesses to provide a more continuous source of potable water. One additional resident was connected to this supply in June 1995. In 1991, TYAD implemented an agreement with the affected residents, which stipulates that the residents will stop using their wells, and in return TYAD will continually supply potable water to the residents until groundwater at the affected private wells is safe for potable use. This agreement also provides that the private wells continue to be made available to the Army for monitoring purposes even though the residents do not use them. Additionally, other residents/businesses will be connected to the TYAD potable water supply if VOC concentrations in their wells exceed applicable MCLs, provided that the exceedance is a result of groundwater contamination from TYAD.

In December 1992, the Army submitted a final FS, which included a three-dimensional groundwater model to simulate flow and transport of contaminants in the subsurface. Results from this modeling indicated, for the no further action alternative, that the VOC plume in the groundwater would not migrate downgradient and would actually decrease in extent and strength over time. The FS recommended remediation of the groundwater by extraction and treatment, and remediation of the contaminated soils through passive volatilization. EPA concurred with this FS in March 1993.

During negotiations on the draft ROD, the Army collected pre-design field data to further delineate contaminated soils in Areas A and B and to evaluate newly installed groundwater extraction wells. The results of the field activities indicated that the actual extent of soil

contamination was less than originally estimated. In fact, the levels of constituents detected in the soils of Area A were less than the soil cleanup levels, and therefore, no treatment was required at this portion of the site. In Area B, the estimated contaminated soil volume was reduced significantly. The pre-design groundwater investigations indicated that extraction of the groundwater was impractical due to the inability of the extraction wells to efficiently recover contaminated groundwater.

As a result of the pre-design investigations, due to the limited soil contamination found onsite in Area B, the Army conducted a Removal Action in July 1995 and removed approximately 2,100 yd³ of VOC-contaminated soils. The removal action, which included excavation and offsite disposal, was conducted instead of using the passive volatilization technology recommended in the FS because it could be implemented more readily as a source control, and it was more cost effective. Post-excavation confirmatory soil sampling in Area B showed concentrations of VOCs in soils to be less than the soil cleanup levels established in 1995. The confirmatory soil sample results will be reviewed based on current toxicity criteria as part of the re-evaluation of the OU-1 MNA remedy to be performed as part of the upcoming annual performance evaluation reports.

Also, as a result of the pre-design investigations, independent EPA investigations, and continued Army and regulatory agency negotiations, EPA and PADEP agreed with the Army's strategy that ultimately lead to the selection of Natural Attenuation/Long-Term Monitoring/Institutional Controls for groundwater.

Since 1988, on-post supply and monitoring wells, as well as off-post residential wells, have been sampled on a semiannual basis under the TYAD Monitor/Residential Well Sampling Program (MWSP). The concentration and the size of the contaminant plumes has continued to decrease over time as predicted. As a result, the semi-annual sampling of on-post supply and monitoring wells, as well as off-post residential wells has been cut back to annual sampling starting in 2007.

3.4.2 Operable Unit 4

In April 1987, EPA performed a preliminary review and visual site inspection to identify potential Solid Waste Management Units (SWMUs) and other areas of potential concern at

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TYAD. This study identified 52 SWMUs, one of which was the UXO area. The 1987 EPA Study recommended that no further action be taken due to the area's low potential for migration of any chemical contaminants into the air, soil, groundwater, or surface water. The 1987 EPA Study did not address any potential for exposure to the UXO from a safety perspective.

In August 1990 TYAD was added to the NPL. In November 1990, the EPA signed a FFA with the Army to investigate the environmental impacts associated with past and present activities at TYAD and to take appropriate remedial actions as necessary to protect the public health and welfare and the environment. The FFA identified 65 Areas of Concern (AOCs) within TYAD, one of which was AOC 55, the UXO area that became OU-4.

From October to December 1998, the Army conducted removal activities to clear approximately 20 acres of land within AOC 55 for construction of a radar testing facility. The footprint of the radar testing facility and an area 100 feet around the facility footprint were cleared to a depth of 4 feet. The fence line and fence line footprint were also cleared to a depth of 4 feet. All other areas within the construction site were cleared to a depth of 1 foot. A total of 187 37-mm, 26 75-mm, 3 3-pounder, 1 81-mm mortar (white phosphorus) and 1 81-mm mortar projectiles were destroyed along with several fuses and flares.

In June 2000, TYAD performed a CERCLA removal action at AOC 55 that involved the installation of a barbed wire fence and warning signs around the perimeter of the entire UXO area. The purpose of this removal was to prevent trespassers and other unauthorized personnel from entering the UXO area and inadvertently coming into contact with any ordnance.

In 2003, a new barbed wire fence was installed from Route 423 to the top of Powder Smoke Ridge, where it ties into the existing barbed wire fence. In the past, the fence ended at the road. Now, the fence extends from the road, along TYAD property, to the top of the ridge.

UXO support was required for two separate activities conducted within OU-4 during 2004. The first activity was UXO avoidance and surface removal support conducted during June 2004 prior to tree clearing operations outside the perimeter fence at the Air Defense Radar Facility located within OU-4. The second activity involved UXO avoidance support for site inspection soil sampling conducted at 10 locations during September 2004.

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A magnetometer-assisted UXO surface sweep was conducted across a 150-foot wide tree clearing zone (approximately 8 acres) outside the Air Defense Radar Facility fence line. A total of seven live UXO were located at the surface in the tree clearing area: five 37-mm high explosive projectiles, one 75-mm shrapnel projectile, and one 81-mm mortar projectile. The seven UXO items were detonated in place on July 8, 2004 by UXO Technicians.

As part of the Military Munitions Response Program (MMRP) Site Inspection conducted at TYAD, a UXO Technician escorted a sampling team to 10 locations within OU-4 during September 2, 2004, where the sampling team collected surface soil samples for explosives (EPA Method 8330) and target analyte list metals analyses. The MMRP Final Site Inspection Report reported the detection of some explosives and metals in surface soil within OU-4, however, the detections were “not considered significant or widespread and are not anticipated to pose a risk to human health or the environment.”

UXO clearance and avoidance operations were also conducted near the southern boundary of OU-4 during May, June, and July 2004 in support of design activities for a proposed Training and Conference Center to be located between Perimeter Road and OU-4. UXO Technicians investigated and cleared UXO from the 4-acre site down to a depth of 2 feet (WESTON, 2004). No UXO were encountered, but 11 munitions debris items related to 75-mm projectiles were identified and removed from the site for disposal.

In 2005 the MMRP Final Site Inspection Report (Malcom Pirnie, 2005) recommended that the perimeter of OU-4 be expanded to include 42 acres of a former artillery range fan at the southeast corner of OU-4 roughly located between Ridge Road and the Depot boundary.

As a result of that recommendation, an approximately 2,000 foot section of new barbed wire perimeter fence was installed around the expanded perimeter of OU-4 during September 2005 and warning signs were posted on the fence. The fence and several gates were installed on the northeast side of the main parking lot and Hap Arnold Boulevard extending from Powder Smoke Ridge Road to near Building 310.

UXO support was required for one activity conducted within the expanded perimeter of OU-4 during 2005. The activity was UXO avoidance support conducted on September 1, 2005, prior to

the installation of the new OU-4 perimeter fence. A magnetometer-assisted UXO surface sweep was conducted along the proposed fence line to ensure that the fence posts could be driven into the ground safely.

3.4.3 Operable Unit 5

In April 1987, EPA performed a preliminary review and visual site inspection to identify potential SWMUs and other areas of potential concern at TYAD. This study identified 52 SWMUs, one of which was the inactive sanitary landfill. The 1987 EPA study recommended that no further action be taken due to the area's low potential for migration of any chemical contaminants into the air, soil, groundwater, or surface water. Later, the FFA identified sixty- 65 AOCs within TYAD, one of which was AOC 1, the inactive sanitary landfill, which became OU-5.

Operations pertaining to the landfill ceased as of 1 July 1979 and the landfill was closed following closure plans approved by PADEP and EPA in accordance with RCRA. Numerous rounds of groundwater sampling were conducted at OU-5 as part of the approved RCRA closure program. Eight groundwater monitoring wells (LF01 through LF08) were installed in the shallow aquifer in 1979 and sampled by TYAD on a quarterly basis for 10 years. The target chemical parameters were determined by PADEP and TYAD during the RCRA permit approval process and consisted of pH, iron, cadmium, chromium, selenium, total lead, total zinc, and total organic carbon. Data from quarterly groundwater sampling of the monitoring well network installed as part of the permitted RCRA closure process did not identify actionable levels of groundwater contamination.

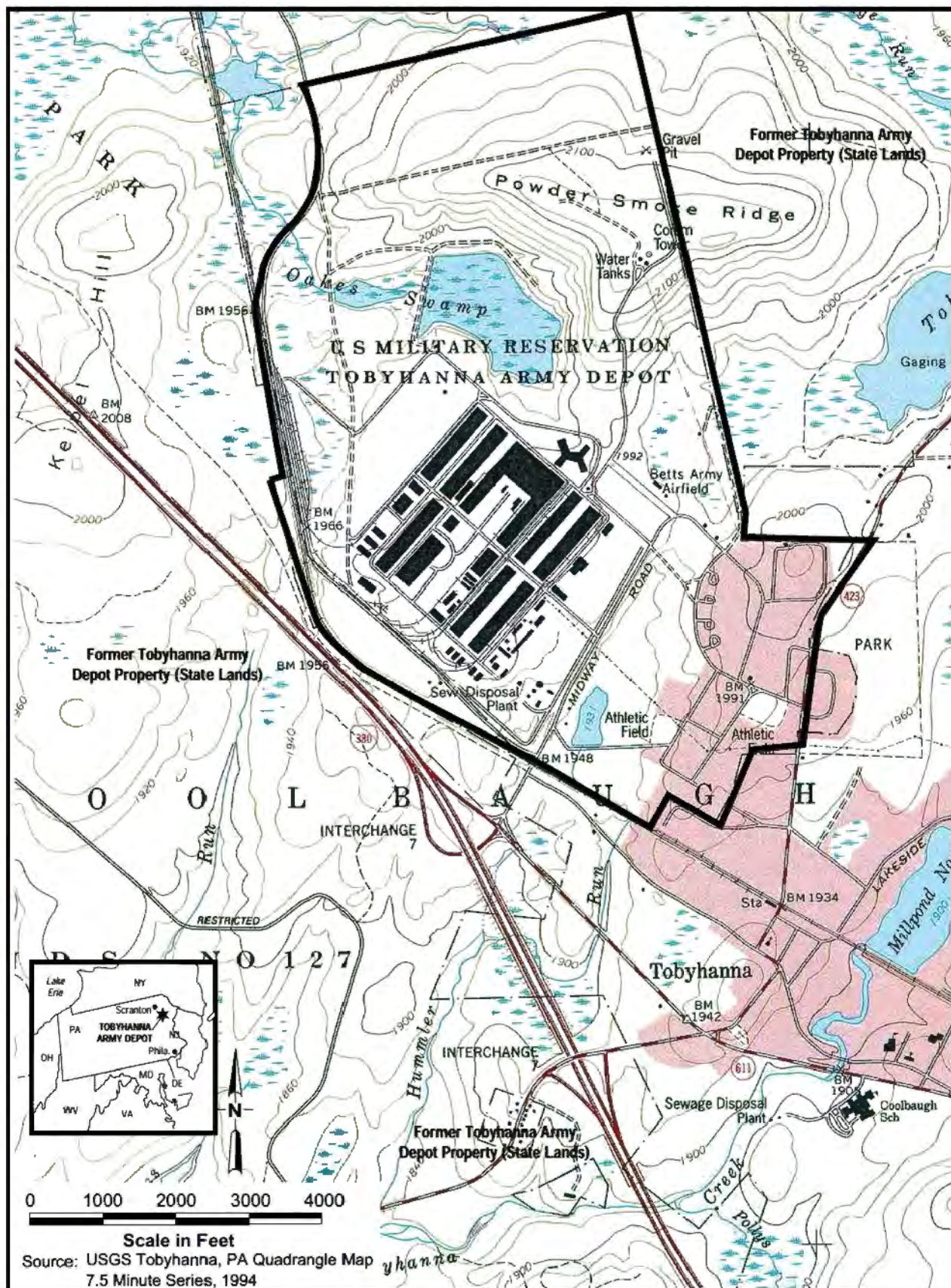
Conditions of OU-5 were further investigated during RIs conducted in 1987-1988 and 1995. During these investigations, additional monitoring wells were installed to either replace abandoned wells or to supply additional data. Following the installation of the replacement wells and abandonment of the damaged wells, a total of 18 monitoring wells (LF01 and LF09 through LF25) existed. Four quarters (December 1995, March 1996, June 1996, and September 1996) of groundwater samples were collected to support the RI. The identified COCs included VOCs, SVOCs and metals. In addition, constant-rate pump tests were conducted at two bedrock

monitoring wells (LF09 and LF25), and a study of the landfill storm water drainage system was conducted.

As a result of those investigations and continued Army and regulatory agency negotiations, EPA and PADEP agreed with the Army's strategies that lead to the selection of Natural Attenuation/Long-Term Monitoring/Institutional Controls for groundwater at OU-5. Since this agreement, OU-5 monitoring wells have been sampled on a semiannual basis through October 2006 under the TYAD Landfill Well Sampling Program (LFWSP). The concentration and the size of the contaminant plumes has continued to decrease over time as predicted. As a result of negotiations between the Army and the regulatory agencies in 2006, the semiannual sampling of the monitoring wells has been cut back to annual sampling starting in 2007.

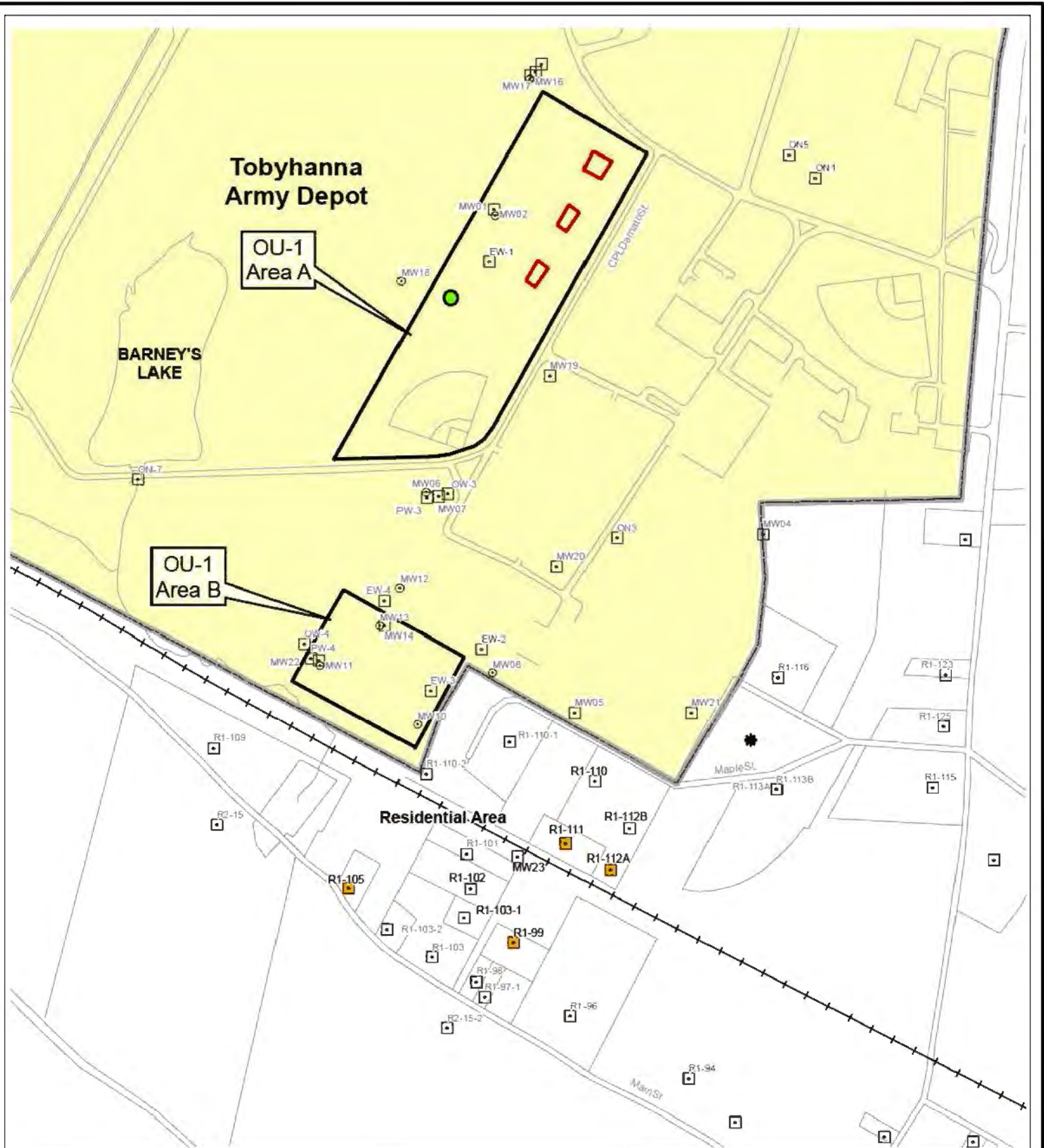
3.5 RESTORATION ADVISORY BOARD

A Restoration Advisory Board (RAB) was established in June 1994 for OU-1 to discuss the ongoing environmental activities at TYAD, which provided the opportunity for community members to get the latest information and discuss community issues and concerns. OU-5 was added to the RAB responsibilities in 2000. Public RAB meetings were held quarterly until public interest waned and the RAB was adjourned by vote at the last meeting on 19 October 2005. TYAD plans to contact the local community to see if there is any current interest in restarting the RAB in 2012, as required by Army guidance.



**FIGURE 3-1 SITE LOCATION MAP
TOBYHANNA ARMY DEPOT**

02P-1107-1 7/15/02



- Legend:**
- Railroad
 - Residences Selected for VIP
 - Approximate Location of Bedrock Monitoring Well
 - Approximate Location of Glacial Till Monitoring Well
 - * Location of new potable water service connection (2011)
 - Proposed Location of PPL Electric High Voltage Transmission Tower
 - New office building constructed with vapor barrier and passive ventilation system
 - Tobyhanna Army Depot

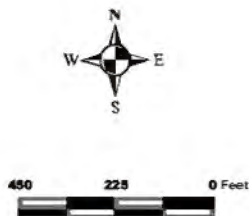
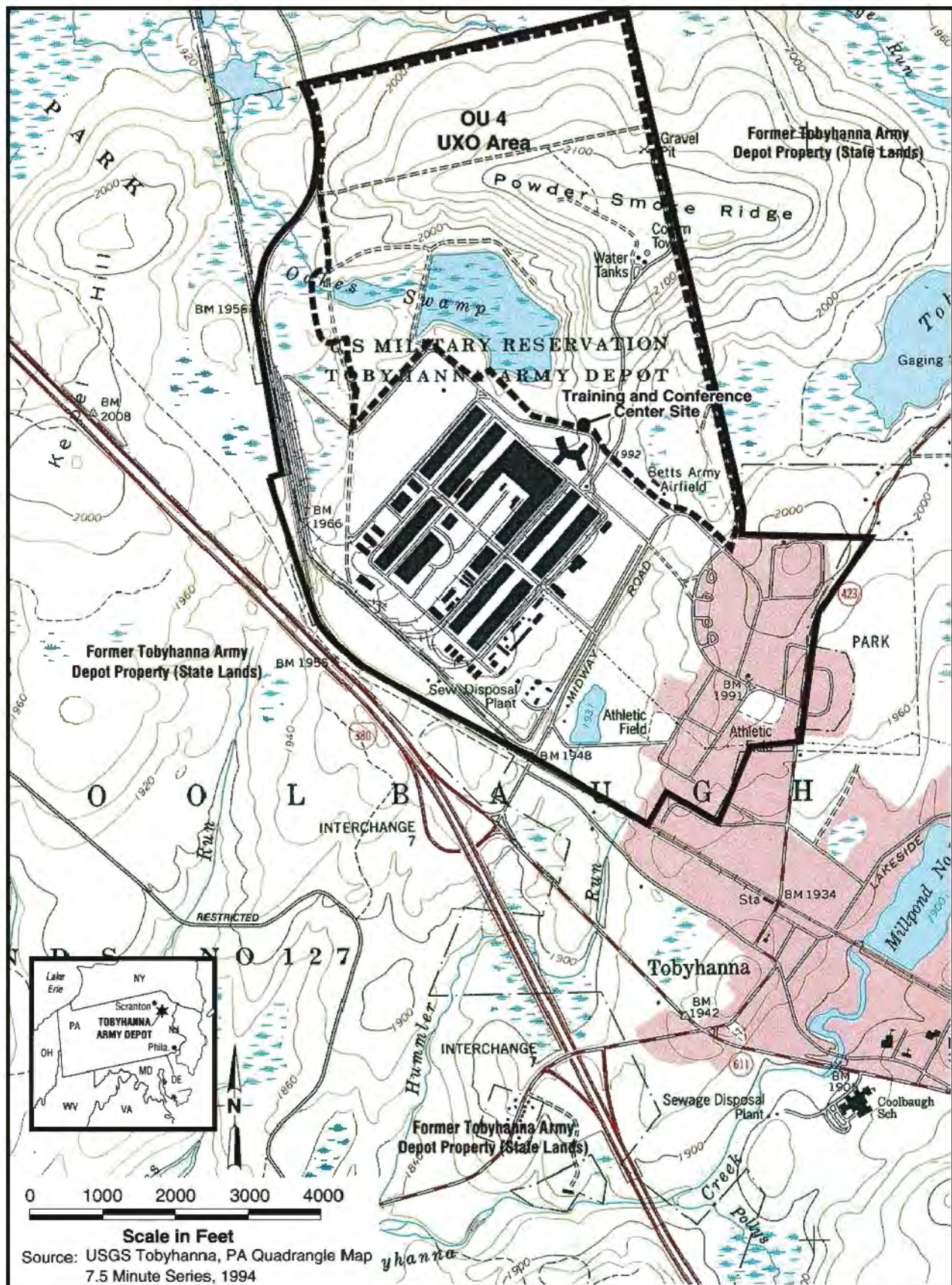
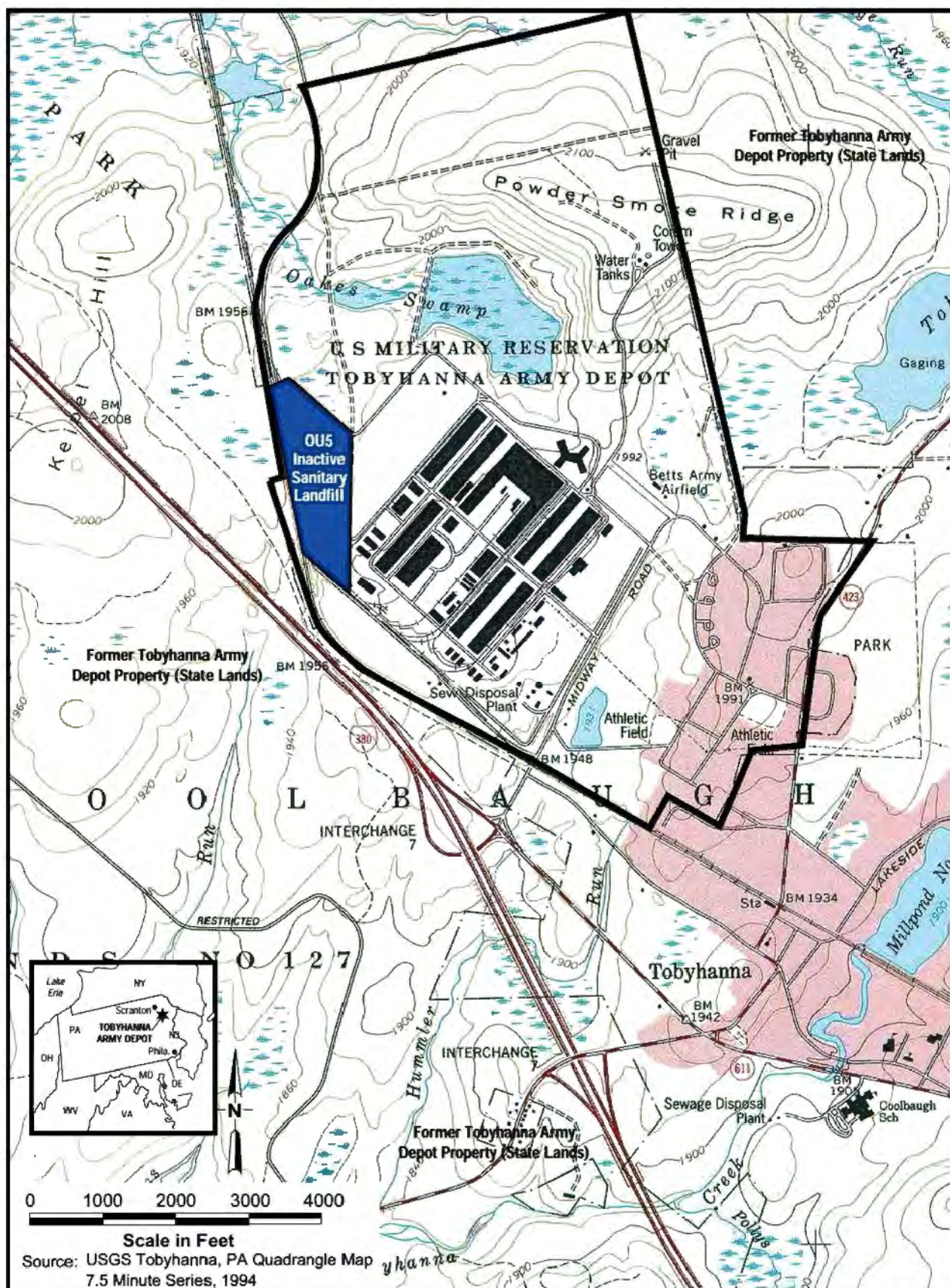


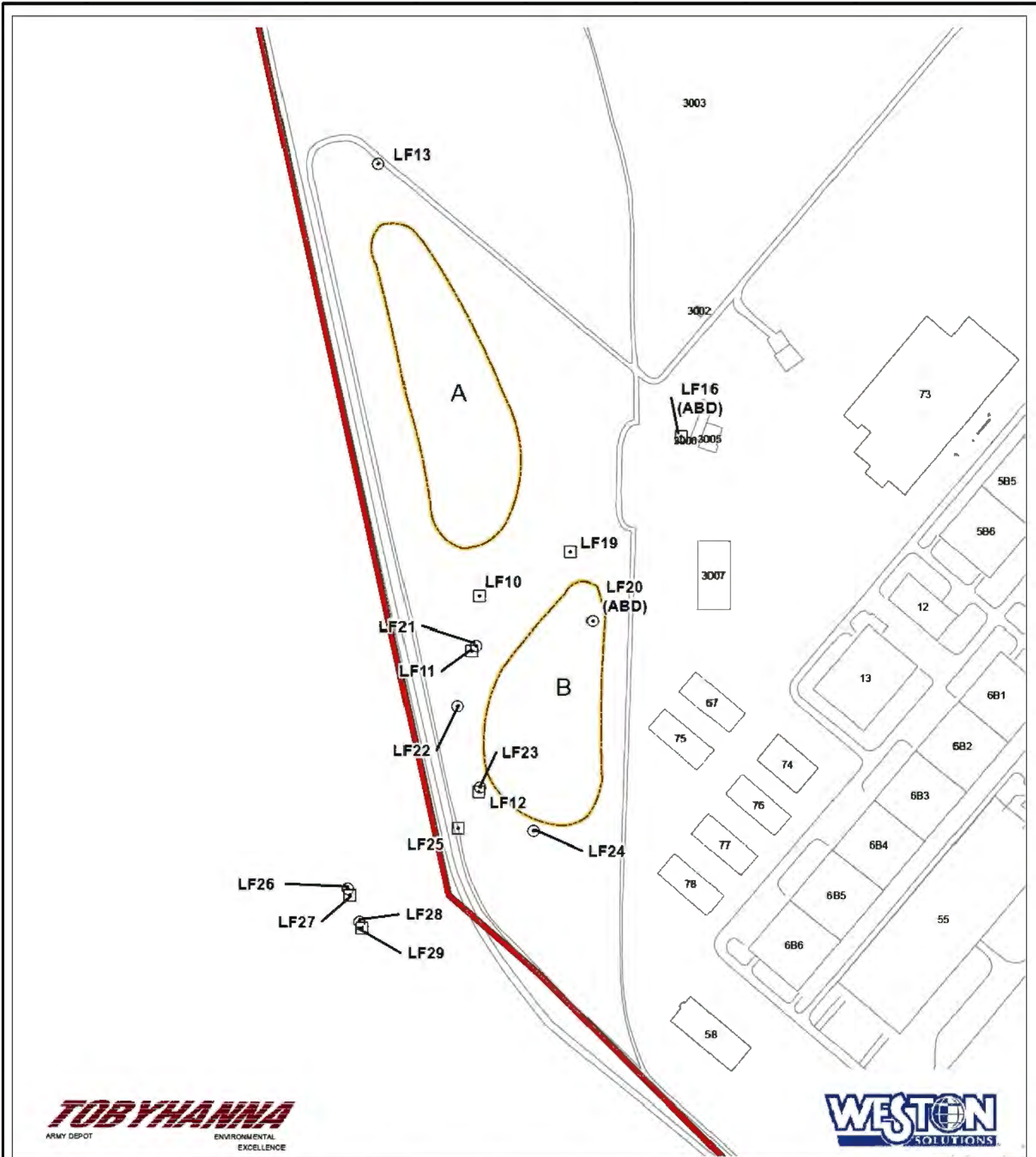
Figure 3-2
OU-1, Areas A and B
Location Map
Tobyhanna Army Depot



**FIGURE 3-3 OU-4 LOCATION MAP
TOBYHANNA ARMY DEPOT**

07P-0831 6/26/07





- Legend:
- Approximate Location of Bedrock Monitoring Well
 - Approximate Location of Glacial Till Monitoring Well
 - ABD Abandoned
 - Approximate Landfill Cell
 - TYAD Property Boundary

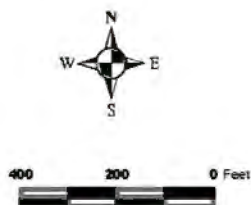


Figure 3-5

OU-5 Monitoring Well Location Map
Tobyhanna Army Depot







Legend:

1930 Groundwater Contour
(Dashed where Inferred)

1921.10 Groundwater Elevation
(ft above Mean Sea Level)

NS Not Sampled

MW-□ Approximate Location of Bedrock
Monitoring Well

MW-⊙ Approximate Location of Glacial Till
Monitoring Well

- - - TYAD Property Line



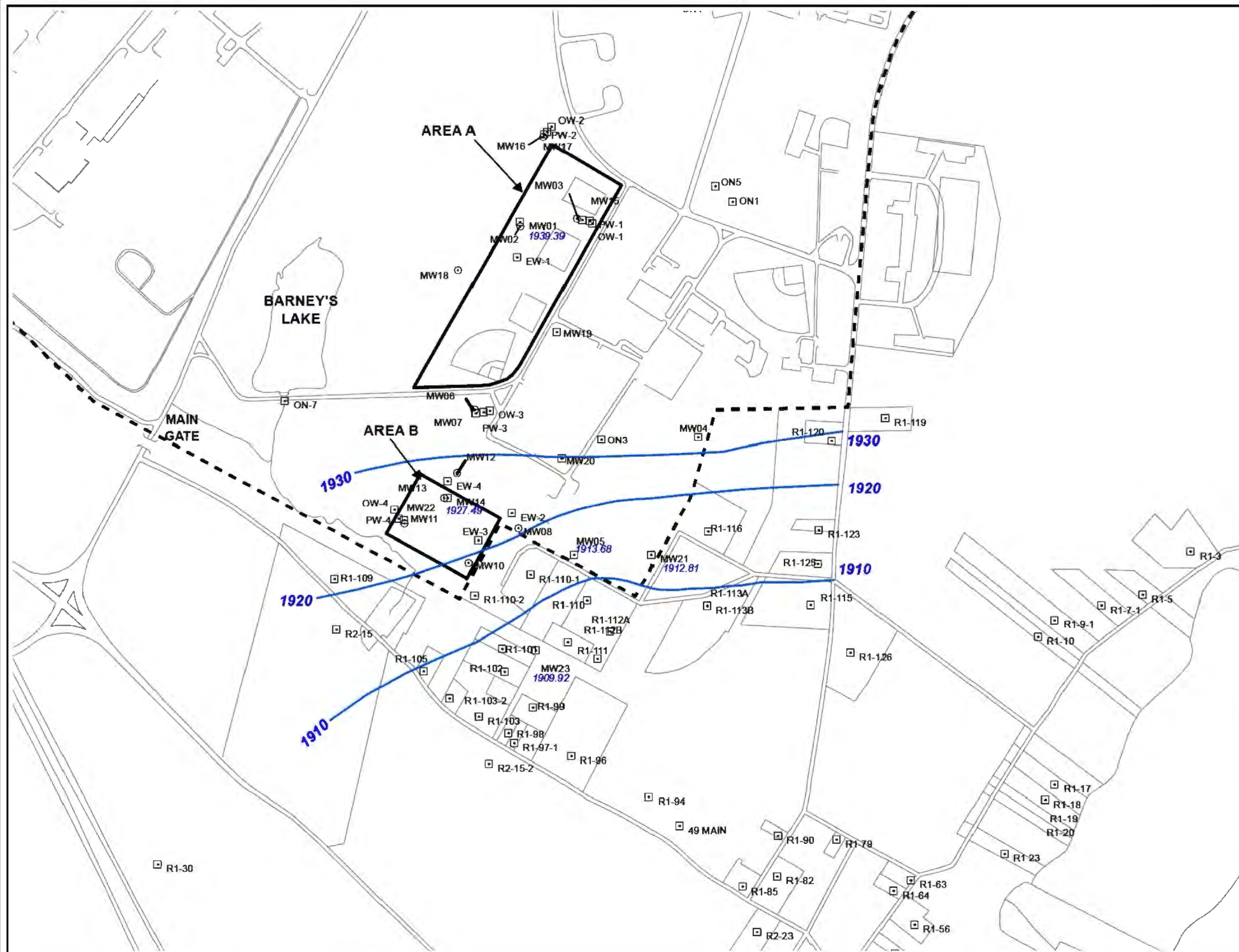
0 250 500 1,000
Feet

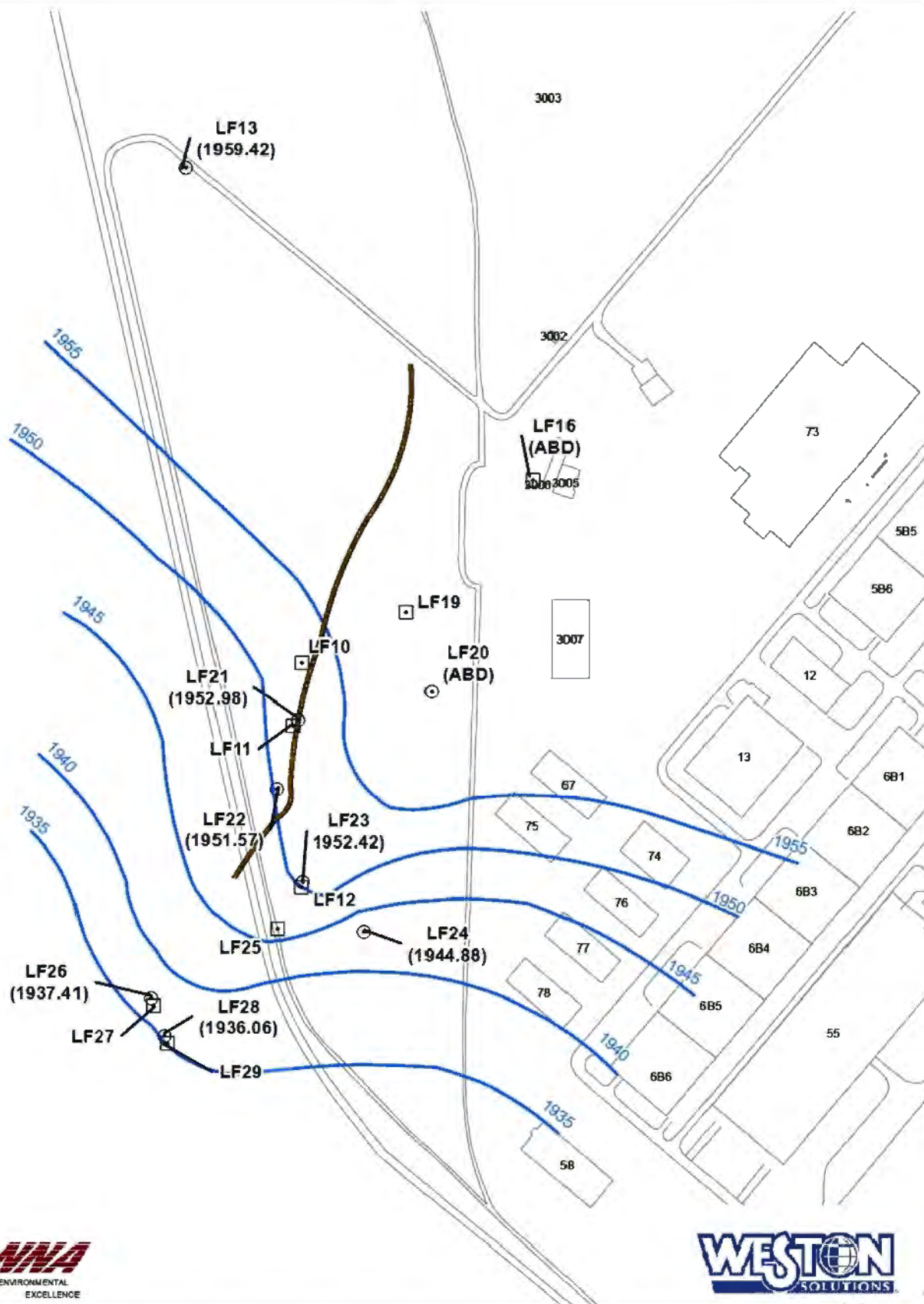
TOBYHANNA
Army Depot Environmental
Excellence



U.S. Army Corps of Engineers
Baltimore District

Figure 3-9
OU-1, Areas A and B
Groundwater Elevation Contours
Bedrock Aquifer
November 2011





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WESTON
SOLUTIONS

Legend:

1940 Groundwater Contours

□ Approximate Location of
Bedrock Monitoring Well

⊙ Approximate Location of
Glacial Till Monitoring Well

ABD Abandoned - November 2006

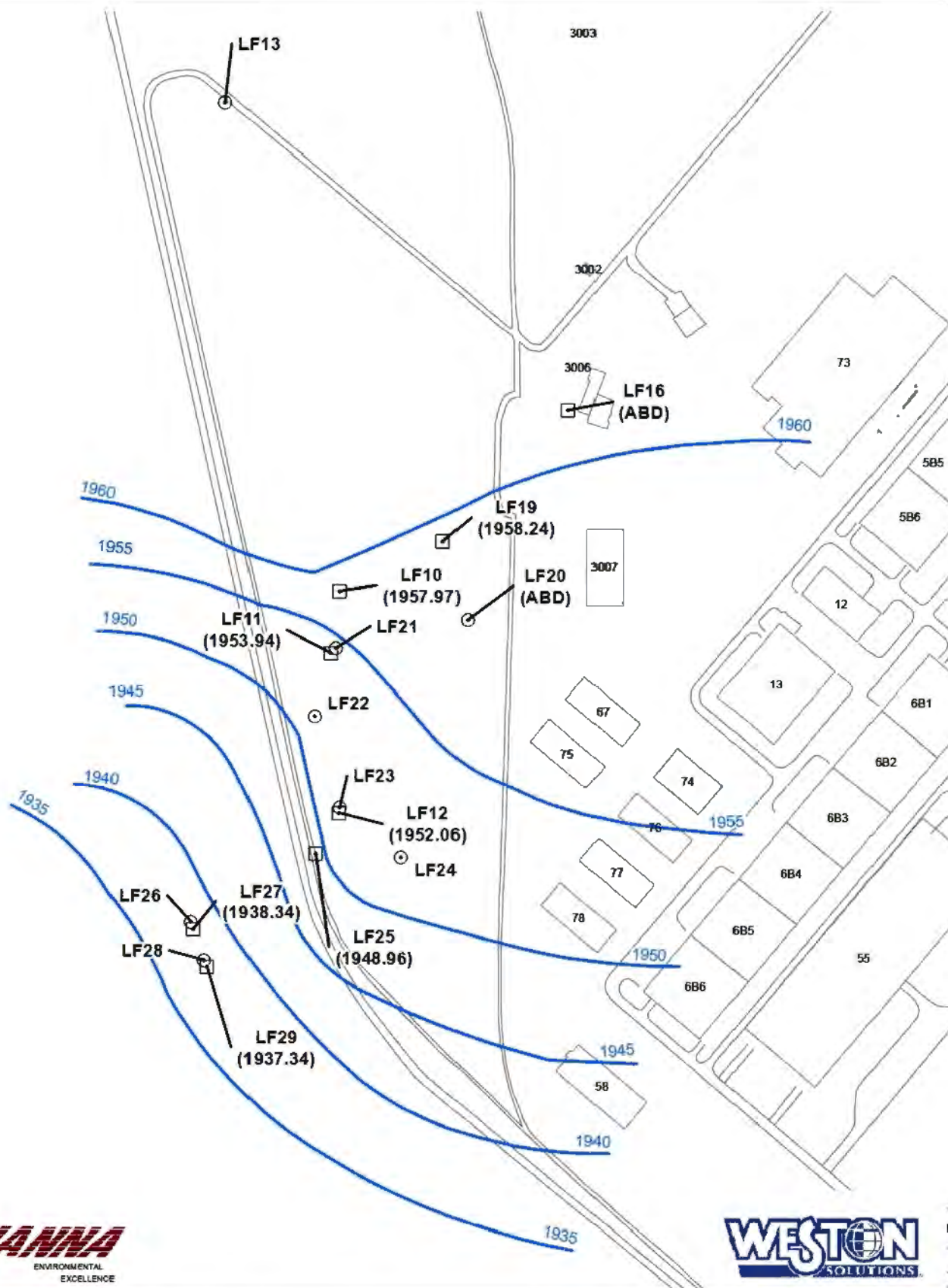
— Stormwater Drainage Pipe



400 200 0 Feet

Figure 3-10

OU-5 Groundwater Elevation Contours
Glacial Till Aquifer
November 2011



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WESTON
SOLUTIONS

Legend:

- Groundwater Contours
- Approximate Location of Bedrock Monitoring Well
- Approximate Location of Glacial Till Monitoring Well
- ABD** Abandoned - November 2006

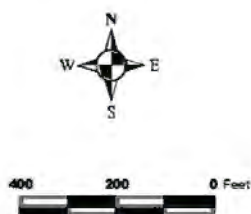


Figure 3-11

OU-5 Groundwater Elevation Contours
Bedrock Aquifer, OU5
November 2011

4. REMEDIAL ACTIONS

The following subsections describe the selected remedies for each OU, how those remedies are being implemented, and what annual costs are associated with each remedy.

4.1 REMEDY SELECTION

4.1.1 Operable Unit 1

The ROD for OU-1 was finalized in September 1997. Remedial Action Objectives (RAOs) were developed as a result of data collected during the RI to aid in the development and screening of remedial alternatives for the ROD. The general objectives of response actions at OU-1 were to: 1) minimize the potential for future migration of VOCs in groundwater; and 2) restore groundwater in the glacial till and bedrock aquifers to beneficial use and to levels protective of human health and environment, as soon as practicable, through natural attenuation. The performance standard for the response action at OU-1 is to achieve MCLs for the following COCs throughout the entire plume of groundwater contamination: vinyl chloride (2 micrograms per liter [$\mu\text{g/L}$]), TCE (5 $\mu\text{g/L}$), and PCE (5 $\mu\text{g/L}$).

An interim objective of the response actions was to continue to prevent exposure of groundwater until it has been restored to federal MCLs. With the completion of the removal action at OU-1, contaminated soil was removed, which resulted in a permanent reduction in the toxicity and volume of contaminated soil and minimized future releases of VOCs to groundwater.

Under CERCLA, Sec. 121, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate federal and state environmental laws and regulations (ARARs), are cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The selected remedy for OU-1 was Natural Attenuation/Long-Term Monitoring/Institutional Controls for groundwater and no further

action for soils. A 15-year time period was selected for the cost estimate to complete the remediation. The contaminant-specific ARARs for groundwater remediation are the federal and state Safe Drinking Water Act MCLs. As part of the long-term monitoring, groundwater samples were to be collected twice per year and analyzed for VOCs (reduced to annually in 2007). Institutional controls include:

- A 1996 agreement with the Coolbaugh Township Zoning Office to notify TYAD of any new construction that will require potable water, which ensures that new wells are not placed in areas of known or suspected contamination. New homes within the OU-1 area are to be supplied with potable water from the TYAD water system.
- The TYAD Master Plan, Section 4 Environmental Quality prohibits the construction of new drinking water wells at TYAD in the areas impacted by OU-1.

4.1.2 Operable Unit 4

The ROD for OU-4 was finalized in September 2000. The RAOs for OU-4 were to: 1) reduce potential exposure to UXO by on-site workers or trespassers; 2) ensure that proper UXO clearance procedures are followed if or when any portion of this area is to be developed by the Army in the future; 3) restrict future uses of the land; and 4) educate the public/employees on the dangers of UXO at OU-4.

The selected remedy for OU-4 was institutional controls, including the following components:

- Physical Controls
- Security Patrols/Monitoring
- UXO Support
- Proprietary Controls
- Public/Employee Education
- Periodic (Five-Year) Review

4.1.3 Operable Unit 5

The ROD for OU-5 was finalized in September 2000. The RAOs for OU-5 were to prevent ingestion of groundwater having contaminants in excess of established drinking

water standards and to remediate contaminated groundwater to usable standards. The specific cleanup goal for OU-5 was to remediate groundwater to achieve MCLs for the following COCs:

- Barium – 2,000 µg/L
- Arsenic – 10 µg/L
- Benzene – 5 µg/L
- Vinyl chloride – 2 µg/L
- 1,2-Dichloropropane – 5 µg/L
- Tetrachloroethene – 5 µg/L
- Trichloroethene – 5 µg/L
- Pentachlorophenol – 1 µg/L
- Bis(2-ethylhexyl)phthalate – 6 µg/L

Under CERCLA, Sec. 121, EPA must select remedies that are protective of human health and the environment, comply with ARARs, are cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The selected remedy for OU-5 was Monitored Natural Attenuation/Institutional Controls. A 30-year time period was selected for the cost estimate to complete the remediation. The contaminant-specific ARARs for groundwater remediation are the federal and state Safe Drinking Water Act MCLs. As part of the monitoring, groundwater samples were to be collected twice per year and analyzed for VOCs, SVOCs, and metals. The data from the groundwater samples were evaluated as part of this Five-Year Review to determine if the size and strength of the groundwater plume is decreasing over time. Institutional controls included the following:

- A 1996 agreement with the Coolbaugh Township Zoning Office to notify TYAD of any new construction that will require potable water, which ensures that new wells are not placed in areas of known or suspected contamination
- Prohibition of any on-post drinking water well construction in the area of OU-5 as documented in the TYAD Master Plan, Section 4 Environmental Quality
- Ongoing public education regarding potential hazards associated with consumption of contaminated groundwater in OU-5
- Results of long-term monitoring presented to all TYAD employees in articles in the installation newspaper

4.2 REMEDY IMPLEMENTATION

4.2.1 Operable Unit 1

Nineteen semi-annual rounds of groundwater sampling have been conducted under the Long-Term Monitoring requirements of the ROD for OU-1. As part of the long-term monitoring, groundwater samples were to be collected twice per year and analyzed for Target Compound List (TCL) VOCs, using EPA Method 8260B, in order to evaluate the effectiveness of the selected remedial alternative. Total and dissolved lead was analyzed using EPA Method 7421 through April 2004, when lead sampling was discontinued by agreement between the Army and the regulators. The COCs for this project are cis-1,2-dichloroethene (cis-1,2-DCE), trans- 1,2-dichloroethene (trans-1,2- DCE), vinyl chloride (VC), TCE, and PCE. In 2007, the sampling frequency was reduced to once per year by agreement with EPA and PADEP. The full list of TCL VOCs continues to be analyzed for using EPA Method 8260B. A total of five annual rounds of groundwater sampling have been conducted through 2011.

The subsequent Semi-Annual Groundwater Monitoring Reports, Annual Groundwater Monitoring Reports, and the first and second Five-Year Reviews completed in 2002 and 2007, respectively, were submitted to TYAD, U.S. Army Corps of Engineers (USACE), the U. S. Army Environmental Center (USAEC), EPA, and PADEP. The Long-Term Monitoring includes the sampling and analysis of groundwater samples from on-post monitor wells, on-post water supply wells, and off-post residential wells. From 1998 to 2011, the number of wells sampled on a semi-annual and annual basis has been reduced as the plume size has decreased, as evidenced by the data collected and analyzed. Prior to each sampling event, the well sampling list was made available for review by EPA in the annual performance evaluation reports. The April 1998 sampling activities conducted at TYAD consisted of sampling 22 on-post monitor wells, 25 off-post residential wells, and 6 on-post water supply wells. The November 2011 sampling activities consisted of sampling 7 on-post monitor wells, 12 off-post residential wells, 1 on-post water supply well, and 1 off-post monitor well.

Institutional controls have been implemented, including Coolbaugh Township's agreement to notify TYAD of any new construction that would require potable water, which ensures that new wells are not placed in areas of known or suspected contamination. During this Five-Year Review period, the zoning officer from Coolbaugh Township received one request from a landowner regarding potable water service. TYAD added a potable water service connection in 2011 for a new house constructed on Maple Street. The EMD at TYAD, which oversees the work at OU-1, also controls the potable water system at TYAD. Although the TYAD Master Plan restrictions on new potable water well construction in OU-1 are still in effect, no new potable water wells are planned for TYAD and the existing wells are predicted to meet TYAD's future water needs.

4.2.2 Operable Unit 4

The components of the selected remedy for OU-4 that have been implemented at TYAD include physical controls, UXO support, public/employee education, proprietary controls, and periodic (five-year) reviews.

Physical Controls

In September 2000, TYAD completed a removal action involving the construction of a barbed-wire fence around OU-4 to deter access to the UXO area. In addition, UXO warning signs were installed at regular intervals around the perimeter and at access points, such as roads. Gates were installed across depot roads to prevent unauthorized, inadvertent access by TYAD personnel or visitors. The keys to the access gates are controlled by TYAD security personnel. Fencing and signs are maintained regularly. Between 22 August and 13 September 2011 approximately 3,000 additional feet of 5-strand barbed wire fence was installed in OU-4 to surround the new radar facilities at the Seal Beach and Barstow sites. UXO hazard signs were installed on every other fence post, approximately 16 feet apart. Additional signs were ordered to replace missing signs along the existing OU-4 fence line.

UXO Support

UXO support is available from Army explosive ordnance disposal (EOD)-trained personnel if future intrusive activities occur within OU-4. Since the ROD for OU-4 was finalized in September 2000, UXO support has been required numerous times for activities inside OU-4 such as brush clearing, fence installation, surface sweeps, and construction.

Public/Employee Education

Public and employee education was implemented through the RAB, which is described in Subsection 3.5. Also, a UXO safety video is shown to personnel before they are allowed access to the site, which is permitted only to those on official business.

Proprietary Controls

Deed restrictions will be placed on the land if it is ever transferred outside the Government.

Periodic (Five-Year) Reviews

Periodic reviews will be performed to ensure that the remedial action remains effective in protecting the public. Periodic reviews will be performed, at a minimum, at five-year intervals in accordance with CERCLA and the NCP until the land is suitable for unlimited use and unrestricted exposure. This report represents the third CERCLA review for the selected remedy for OU-4. The next CERCLA review for OU-4 is required in 2017. Also, annual performance evaluations of the selected remedy have been conducted. The findings can be found in the Annual Performance Evaluation reports referenced in Section 6.

The institutional controls implemented for OU-4 have proven to be effective and there have been no significant incidents or breaches of the physical controls. In 2008, approximately 100 feet of fence line was repaired following winter storms which caused fallen trees. Between April and May 2010, tree and brush were cleared on both sides of the perimeter fence along the northern, eastern, and western boundary of OU-4. Fencing and signs are maintained regularly, and annual funds have been designated accordingly.

As part of homeland security measures at the post, a security fence was installed on a portion of the post abutting the State Game Lands. This fence was built to enclose the entire facility. The security fence currently has UXO warning signs and is checked monthly for any type of damage.

4.2.3 Operable Unit 5

Nineteen rounds of groundwater sampling have been conducted under the Long-Term Monitoring requirements of the ROD from February 2000 to November 2011. As part of the long-term monitoring, groundwater samples were to be collected twice per year and analyzed for TCL VOCs, TCL SVOCs, total cyanide, and total and dissolved metals. In 2007, the sampling frequency was reduced to once per year. The full list of TCL VOCs were analyzed using EPA Method 8260B. The full list of TCL SVOCs were analyzed by EPA Method 8270C. The total cyanide was analyzed using EPA Method 9012. The 23 target analyte list (TAL) metal analyses were performed according to EPA Methods 6010B, 6020, and 7470A.

The Semi-Annual Groundwater Monitoring Reports and the first and second Five-Year Review completed in 2002 and 2007, respectively, were submitted to EPA and PADEP. In 2007, the sampling frequency was reduced to once per year by agreement with EPA and PADEP. Five annual rounds of groundwater sampling have been conducted through 2011 and annual reports submitted to EPA and PADEP.

Institutional controls have been implemented, including Coolbaugh Township's agreement to notify TYAD of any new construction that would require potable water, which ensures that new wells are not placed in areas of known or suspected contamination. During this Five-Year Review period, the zoning officer from Coolbaugh Township received one request from a landowner regarding potable water service. TYAD added a potable water service connection in 2011 for a new house constructed on Maple Street in OU-1, so the existing agreement is still working. The EMD at TYAD, which oversees the work at OU-5, also controls the potable water system at TYAD. Although the TYAD Master Plan restrictions on new potable water well construction in OU-5 is

still in effect, no new potable water wells are planned for TYAD and the existing wells are predicted to meet TYAD's future water needs.

4.3 SYSTEM OPERATIONS/OPERATIONS AND MAINTENANCE

The system operations and maintenance (O&M) costs for OU-1, OU-4, and OU-5 include the costs for groundwater and vapor monitoring, UXO fence maintenance, public involvement, potable water connections, security patrols, and employee education. The costs for the operation and maintenance of the ON-3 potable water well air stripper are minimal and tracked by TYAD as part of the costs provided in **Table 4-1**.

The potable water supply system at TYAD consists of six water supply wells (ON-1 through ON-6). The water supply system operates on a cascading, on-demand basis controlled by water level switches in the storage tanks, so water from the six wells is mixed together prior to usage. The six TYAD water supply wells are located in the eastern portion of TYAD and completed in bedrock at depths ranging from 185 to 450 feet. With the exception of ON-3, all of the potable water wells are located hydraulically upgradient of OU-1.

Well ON-3 and the associated air stripper are currently operational. Maintenance is performed on an as-needed basis, and consists primarily of an air blower motor and packing media replacement. The ON-3 influent and effluent are monitored on an annual basis and the influent COC concentrations have not exceeded MCLs since 1997.

Table 4-1 Annual System Operations/O&M Costs for OU-1, OU-4, and OU-5

| Year | Operable Unit | Operations/O&M Cost |
|------|---------------|-------------------------|
| 1997 | OU-1 | \$153,316 |
| 1998 | OU-1 | \$108,001 |
| 1999 | OU-1 | \$72,174 ^(a) |
| 2000 | OU-1 | \$83,605 |
| | OU-4 | \$2,500 |
| | OU-5 | \$29,586 |
| 2001 | OU-1 | \$70,098 |
| | OU-4 | \$2,500 |
| | OU-5 | \$64,658 |

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**Table 4-1 Annual System Operations/O&M Costs for OU-1, OU-4, and OU-5
(Continued)**

| Year | Operable Unit | Operations/O&M Cost |
|------|-----------------|---------------------|
| 2002 | OUs 1, 4, and 5 | \$100,000 |
| 2003 | OUs 1, 4, and 5 | \$0 ^(b) |
| 2004 | OUs 1, 4, and 5 | \$145,000 |
| 2005 | OUs 1, 4, and 5 | \$150,000 |
| 2006 | OUs 1, 4, and 5 | \$210,000 |
| 2007 | OUs 1, 4, and 5 | \$79,000 |
| 2008 | OUs 1, 4, and 5 | \$117,000 |
| 2009 | OUs 1, 4, and 5 | \$108,000 |
| 2010 | OUs 1, 4, and 5 | \$92,000 |
| 2011 | OUs 1, 4, and 5 | \$104,000 |

Notes:

- ^a Fall 1999 round was not conducted per EPA direction due to drought conditions.
^b Sufficient funds were available from the 2002 budget to cover 2003 operations.

5. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

5.1 OPERABLE UNIT 1

All groundwater samples collected between 2007 and 2011 were analyzed for TCL VOCs using EPA Method 8260B. Sample results for the COCs cis-1,2-DCE, trans-1,2-DCE, vinyl chloride, PCE, and TCE, are provided in **Table 5-1**. The sample results were compared against the EPA MCLs for the COCs.

Historical TCE and PCE concentrations for the MWSP, dating back to April 2001, are presented in **Tables 5-2** and **5-3**, respectively. TCE and PCE concentrations detected in the bedrock aquifer during the 2007 and 2011 sampling events were used to generate the contaminant contour maps shown in **Appendix A**.

Analytical data on TCE and PCE groundwater concentrations at selected OU-1 monitoring wells from April 2001 through November 2011 were evaluated by the nonparametric Mann-Kendall (MK) test using ProUCL v.4.1 statistical software. Data preparation included review of analytical qualifiers and coding the detection status for each of the analytical results. Data with U and UJ flags were recorded as non-detects at the reporting limit and all other data including J or B flagged results were recorded as detections.

A significance level of 95% was selected for the MK test trend evaluation. The results of the MK tests are summarized in **Table 5-4**. For those wells and constituents with MK test results indicative of statistically significant increasing (large positive S values) or decreasing (large negative S values) trends, plots were generated with ordinary least squares (OLS) regression lines and/or Theil-Sen trend lines (see **Appendix A**) to estimate the slope of the observed trend.

The results of the MK analysis show a decreasing TCE concentration trend at OU-1 Area A (well MW01) and a decreasing or no trend for TCE in groundwater at OU-1 Area B and the downgradient residential area. With the exception of MW-23, the TCE concentrations detected at the other OU-1 monitoring wells are either at or below the MCL of 5 µg/L, so the trends are related to small changes in concentration.

FINAL

The results of the MK analysis show no trend for the low ($< 1 \mu\text{g/L}$) PCE concentrations at OU-1 Area A (well MW01), a decreasing or no trend for PCE concentrations in groundwater at the OU-1 Area B source area, and an increasing (MW-23) or no trend in the downgradient residential area. However, none of the PCE concentrations detected at the OU-1 monitoring wells exceeded the MCL of $5 \mu\text{g/L}$.

The TCE and PCE plumes have decreased significantly from the initial 1988 area measurements. Based on an analysis of the existing groundwater data since the September 1994 sampling event, the plumes have decreased in overall size (see **Figure 5-1**) at the following approximate average rates:

- $1 \mu\text{g/L}$ TCE plume: 170,030 square feet per year (ft^2/year) or 3.90 acres/year.
- $5 \mu\text{g/L}$ TCE plume: 62,372 ft^2/year or 1.43 acres/year.
- $1 \mu\text{g/L}$ PCE plume: 84,974 ft^2/year or 1.95 acres/year.
- $5 \mu\text{g/L}$ PCE plume: Since the September 1994 sampling event there have only been a few detections of PCE above the $5 \mu\text{g/L}$ MCL, at wells other than MW11. MW05 showed a detection of PCE ($5.00 \mu\text{g/L}$) in October 2005. MW23 showed detections of PCE in April 2004 ($7.60 \mu\text{g/L}$), October 2005, April 2006, October 2006 ($5.00 \mu\text{g/L}$), and November 2009 ($5.20 \mu\text{g/L}$).

Based on an estimation of the change in the TCE plume volume exceeding the MCL between 1988 and 2011, using a 10% effective porosity for the bedrock (most of the plume is in bedrock groundwater), the TCE plume has decreased in volume from 150 million gallons in January 1988 to approximately 24.1 million gallons in November 2011. Please note that there was a change in groundwater sampling methods in October 2004 that impacted the COC analytical results and shifted the COC concentrations upward.

A review of the COC concentrations and plume area trends over the last 5 years shows that there is no significant downward trend. The concentrations and the plume areas have increased and decreased slightly over these last five years based on the annual sampling data. However, because the COC concentrations are just above or just below the MCLs, this lack of a decreasing trend is not considered a significant issue.

The groundwater wells at OU-1 have been classified based on a review of the analytical data from the last 25 rounds of sampling (September 1996 through November 2011). **Appendix A** presents a summary of the classification of each well for each sampling round since September 1996. The groundwater in each well was classified as being above MCLs (hits), below MCLs (BMCL), not sampled (NS), or no detections (ND). The rationale used to determine the number of wells to be sampled during each round is based on these classifications and subsequent discussions with EPA, PADEP, and the Army.

During the second Five-Year Review, it was recommended that vapor intrusion pathway (VIP) sampling be conducted at off-site residences due to the concentrations of TCE detected in off-post MW-23, which is surrounded by residential homes. Given the proximity of this well to local residences, a study to evaluate the potential for vapor intrusion into these homes was recommended by the EPA and PADEP.

TYAD conducted two rounds of VIP and sump water sampling at four residences located southeast of OU-1 (**Figure 3-2**) during winter (March) 2011 and fall (October) 2011. No contaminants were found in the air samples or sump water samples in the first sampling round. During the second sampling round, no contaminants were found in the sump water from any of the four residences. There were contaminants found in the indoor air sampling results in two of the resident's homes during the second sampling round; however, it is believed that these detections were not related to contamination at OU-1. The *Draft Vapor Intrusion Pathway Study Report Tobyhanna Operable Unit 1* (WESTON, 2012) summarizes the VIP results and is currently under review by EPA and PADEP. TCE was detected on the first floor of one of the residences. This first floor location will be sampled again in the fall of 2012 to confirm that the detected levels of TCE were the result of a household source rather than from contamination at OU-1. The results of this sampling and the comments from the regulatory review of the Draft Vapor Intrusion Pathway Study Report for Tobyhanna Operable Unit 1 (Weston, 2012) will be put into a final report which will be completed by the 4th quarter 2012. A summary of the VIP study results is presented in **Appendix B**.

The construction of three new office buildings along Corporal Damato Street in TYAD started in 2010. The first building was completed in January 2011, the second is currently scheduled to be

completed in April 2012 and the third has not been started yet (see **Figure 3-2**). These buildings are being built within the footprint of Area A in OU-1 and are being constructed using sub-slab vapor barriers and passive vapor ventilation systems (see **Appendix C** for construction details) because of potential vapor intrusion issues related to the VOCs detected in the groundwater in Area A. As part of the building construction, four groundwater wells located within the construction footprint were abandoned PW-1, OW-1, MW-03, and MW-15. None of the wells were part of the current groundwater monitoring network for OU-1 Area A.

PPL Electric Utility is currently installing a series of high voltage electrical towers across the Depot. One of the towers is scheduled to be built within OU-1 Area A, as shown on **Figure 3-2** and in **Appendix C**. The construction of the concrete base of the tower is expected to extend approximately 29 feet below ground surface and involve deep soil excavation and dewatering. TYAD collected groundwater samples from nearby monitor well MW-18 to determine the latest concentration of groundwater in that portion of Area A because MW-18 had not been sampled since 2001. The groundwater analytical results were all non-detect (at the reporting limit of 1 µg/L) for the Area A COCs.

Institutional controls have been implemented including Coolbaugh Township's agreement to notify TYAD of any new construction that would require potable water, which ensures that new wells are not placed in areas of known or suspected contamination. During this Five-Year Review period, the zoning officer from Coolbaugh Township received one request from a landowner regarding potable water service. TYAD added a potable water service connection in 2011 for a new house constructed on Maple Street (see **Figure 3-2**).

TYAD has conducted interviews with members of the public who own property with wells that have been impacted by the TYAD groundwater contamination and provided summaries of issues raised by residents at previous home visits and public meetings conducted over the last five years. The interview forms and issue summaries are provided in **Appendix F**.

A list of recommendations was presented for the groundwater sampling program at OU-1 in the *Draft 2011 Annual Performance Evaluation Report for OU 1, OU 4 and OU 5* (WESTON, 2011). If these recommendations are approved by EPA and PADEP during their review of the Draft Report, TYAD will implement these changes starting with the 2012 annual sampling round

scheduled for Fall 2012. The recommendations are meant to optimize groundwater monitoring activities and provide a more comprehensive understanding of groundwater conditions in the area. The recommendations are as follows:

- Re-establish rights of entry for property R1-94 with the new owners. This property is critical to sample to develop complete and accurate contaminant plume maps.
- Collect groundwater elevations for the following un-sampled monitoring wells in order to better delineate the groundwater flow in the area: MW-04, MW-07, MW-19, MW-20, and MW-22.
- Remove monitoring well MW-12 from the sampling list. MW-12 is not needed for groundwater contour development and plume delineation in glacial till because MW-13 is located nearby.
- Remove residential well R1-116 from the sampling list. COCs have either not been detected or have all been below 1 µg/L at R1-116 for 10 years.

5.2 OPERABLE UNIT 4

UXO support was required between 2007 and 2011 on numerous occasions, mainly in support of the Barstow and Seal Beach Radar Construction Sites and maintenance of the UXO perimeter fence. In 2008 a MEC (including UXO) removal action was conducted at the Barstow Radar Construction Site on Powder Smoke Ridge. Approximately 178 UXO items were found and destroyed on 29 acres that were cleared of UXO and trees to prepare for the radar construction. A total of 143 37-mm, 19 75-mm, 6 3-pounder, 3 155-mm, 2 60-mm mortar projectiles, and 2 white phosphorus grenades were destroyed along with several fuses and flares. A subsurface UXO removal was conducted for the 8-acre Barstow radar construction area (80 subsurface UXO removed) and a surface UXO clearance was conducted for the remaining 21 acres (95 surface UXO removed).

A second MEC removal action was conducted at the Seal Beach Radar Construction Site between 27 April and 1 October 2009. A total of 40 surface and subsurface UXO items were found and destroyed. The UXO items included 25 37-mm projectiles, 13 75-mm projectiles, 1 60-mm mortar projectile, and 1 81-mm white phosphorus mortar projectile. A subsurface MEC clearance was conducted at the 2-acre radar construction site and a surface clearance was conducted across the remaining 20 acres.

Between 26 April and 11 May 2010, tree and brush clearing was conducted along both sides of the TYAD perimeter fence along the northern, eastern, and western boundary of OU-4. To support brush and tree clearing operations UXO Technicians conducted a MEC surface clearance for 1.75 miles of perimeter fence along the boundary of OU-4, extending the sweep out to 6 feet on both sides of the fence. No UXO were found during the fence clearing operations.

In preparation for the radar construction work, a MEC surface sweep was conducted across the entire limits of the Barstow and Seal Beach Radar Construction Sites beginning on 19 April 2010. Also, during the preliminary earth moving operations for the Barstow and Seal Beach Radar Construction Site, UXO avoidance support was provided for the radar construction contractor from 19 July through 7 October 2010 because some of the planned excavation work was below the depth of the previous MEC Removal Actions. No additional UXO were located during these operations.

In preparation for fence installation work at OU-4, UXO Technicians conducted a MEC surface sweep along the proposed fence line perimeter of the Barstow and Seal Beach Radar Construction Site on 22 August 2011 to ensure it was safe to drive the new fence posts. The location of the new UXO fence surrounding the radar sites is presented in **Appendix C**.

The USACE is conducting a MEC removal in the State Park and State Game Lands that are adjacent to TYAD. In preparation for the removals the USACE has conducted meetings with local regulatory agencies and the public to inform them of what actions will be carried out each year and how they will be affected. TYAD has participated in each of these public meetings. However, the MEC issues brought up during these meetings predominantly concern the MEC clearing in the State Park and State Game Lands rather than MEC at TYAD.

As part of the Five-Year Review, a MEC hazard assessment (HA) was conducted for OU-4 and a Hazard Level Category of 2 was determined, which means that the site is considered a former target area with UXO remaining at the ground surface. The hazard level was determined using the MEC HA workbook, which is a tool to assess explosive hazards to human receptors at munitions response sites. The MEC HA allows one to evaluate potential explosive hazard associated with a site, given current site conditions, under various cleanup, land use activities,

and land use control alternatives. The MEC HA Hazard Level Categories range from 1 through 4, with 1 being the most dangerous level.

The current activities associated with OU-4 have been assessed at a Hazard Level Category of 2 and a score of 772 out of 1,000 (**Appendix G**). The main factors which contribute to the score are the 155-mm high explosive (HE) projectile, the surface UXO and the former target area located within OU-4.

5.3 OPERABLE UNIT 5

From 2000 to 2006, OU-5 monitoring wells have been sampled on a semi-annual basis under the TYAD LFWSP. In 2007 the sampling frequency was reduced to once per year. Groundwater samples collected from the LFWSP monitor wells were analyzed for the following Target Compound List/Target Analyte List (TCL/TAL) analytes:

- TCL VOCs (using EPA Method 8260B), LF: 10, 11, 12, 19, 21, 22, 23, 24, 25, 26, 27, 28, and 29.
- TCL SVOCs (using EPA Method 8270C), LF: 26, 27, 28, and 29.
- Total cyanide (using EPA Method 9012), LF: 13, 22, 23, 24, 26, 27, 28, and 29.
- TAL 23 total and dissolved metals (using EPA Methods 6010B, 6020 and 7470A), LF: 13, 22, 23, 24, 26, 27, 28, and 29.

Sample results from the past five years for the COCs are provided in **Tables 5-5 and 5-6**. Historical sampling results, dating back to April 2001, for benzene, PCE, TCE, vinyl chloride, and arsenic are presented in **Tables 5-7 through 5-11**, respectively. PCE, TCE, vinyl chloride, concentrations detected in the glacial till aquifer and bedrock aquifer during this sampling event were also used to generate the contaminant contour maps shown in **Appendix D**.

Analytical data on TCE, PCE, benzene, vinyl chloride, and dissolved arsenic groundwater concentrations at selected OU-5 monitoring wells over the period from April 2001 through November 2011 were evaluated by the nonparametric MK test using ProUCL v.4.1 statistical software. Data preparation included review of analytical qualifiers and coding the detection

status for each of the analytical results. Data with U and UJ flags were recorded as non-detects at the reporting limit and all other data including J or B flagged results were recorded as detections.

A significance level of 95% was selected for the MK test trend evaluation. The results of the MK tests are summarized in **Table 5-12**. For those wells and constituents with MK test results indicative of statistically significant increasing (large positive S values) or decreasing (large negative S values) trends, plots were generated with OLS regression lines and/or Theil-Sen trend lines (see **Appendix D**) to estimate the slope of the observed trend.

The results of the OU-5 groundwater MK analysis identified the following trends:

- Benzene – no significant trends were identified and the concentrations are currently below the 5 µg/L MCL.
- PCE – a decreasing trend in the Glacial Till Unit, but an increasing trend in the bedrock groundwater. However, there is no trend at the downgradient edge of the plume (MW-27).
- TCE – an overall increasing trend in both the Glacial Till Unit and in bedrock groundwater. There is also a slight increasing trend at the downgradient edge of the plume (MW-26 and MW-27).
- Vinyl Chloride – no significant trend or a decreasing trend with concentrations currently at or below the 2 µg/L MCL.
- Arsenic - no significant trend or an increasing trend (well LF-13). The 2011 arsenic concentrations in LF-13 groundwater were 36 µg/L, as compared to the MCL of 10 µg/L.

The concentration and the size of the contaminant plumes has continued to decrease over time, as predicted, for all the contaminants except TCE. However, fluctuation in the areal extent of the plume is to be expected as the concentrations of COCs continue to hover around the MCLs in wells near the edge of the plume. Any increases in plume areas were not necessarily due to COC concentration trends, but instead due to fluctuations in COC concentrations above and below the contour thresholds of 1 µg/L and 5 µg/L. Although the plume areas fluctuate from year to year, an overall decreasing trend is expected to continue for most COCs. Additional investigation of the increasing TCE concentrations in groundwater is planned.

The TCE plume needs to be monitored closely. It appears that additional TCE source material has impacted the landfill groundwater starting around 2004. This is probably related to higher than usual groundwater elevations that were observed in 2004. The higher groundwater table may have come in contact with landfill materials with residual concentrations of TCE and the TCE may have leached into the groundwater during that period. The jump in groundwater concentrations of TCE may also be related to the change in sample collection methods, switching from sample collection using a bailer to low-flow pumping, in 2004. If the TCE concentrations level off or start to decrease, then the site conditions have stabilized. If the TCE concentrations continue to increase, additional evaluation may be necessary.

The groundwater wells have been classified based on a review of the analytical data from the last twelve years of sampling (February 2000 through November 2011). **Appendix D** presents a summary of the classification of each sampling round since September 1996. The groundwater in each well was classified as being above MCLs (Hits), BMCLs, not sampled (NS), or no detections (ND). The rationale used to determine the number of wells to be sampled during each round is based on these classifications and subsequent discussions with EPA and the Army.

TYAD has provided summaries of issues raised by residents during discussions conducted over the last five years. Most issues raised by the public involve OU-1 rather than OU-5 due to the residences impacted by the OU-1 groundwater plume. The issue summaries are provided in **Appendix F**.

A list of recommendations was presented for the groundwater sampling program at OU-5 in the *Draft 2011 Annual Performance Evaluation Report for OU 1, OU 4 and OU 5* (WESTON, 2011). If these recommendations are approved by EPA and PADEP during their review of the Draft Report, TYAD will implement these changes starting with the 2012 annual sampling round scheduled for fall 2012. The recommendations are meant to optimize groundwater monitoring activities and provide a more comprehensive understanding of groundwater conditions in the area. The recommendations are as follows:

- Remove cyanide from analyte list. Cyanide has only been detected during two sampling rounds in any LF wells since sampling began in February 2000. These detections in 2009 and 2010 were well below the MCL (see **Table 5-6**).

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- Remove SVOCs from analyte list. SVOCs have not been detected in any LF wells in the last 7 years.
- Remove monitoring well LF-24 from sampling list. COCs have either not been detected or have all been below 0.5 µg/L at LF-24 over the last 10 years. This well is also not needed for groundwater contour development in the glacial till because monitoring well LF-23 is located nearby.

TABLE 5-1
MWSP GROUNDWATER SAMPLING RESULTS
VOLATILE ORGANIC COMPOUNDS OF CONCERN
2007 - 2011
TOBYHANNA ARMY DEPOT

| WELL ID | Aquifer | Analyte: | cis-1,2-DCE | | | | | trans-1,2-DCE | | | | |
|----------|---------|----------|-------------|---------|--------|--------|--------|---------------|---------|--------|--------|--------|
| | | MCL: | 70 | | | | | 100 | | | | |
| | | Date: | 2007 | 2008 | 2009 | 2010 | 2011 | 2007 | 2008 | 2009 | 2010 | 2011 |
| MW01 | BR | | 2.00 | 3.04 | 3.70 | 3.60 | 2.80 | 1.00 U | 1.00 U | 0.41 J | 0.17 J | 1.00 U |
| MW02 | GT | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW05 | BR | | 0.50 J | 0.53 J | 0.61 J | 0.61 J | 0.42 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| MW11 | GT | | 2.00 | 2.69 | 2.10 | 3.60 | 1.60 | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| MW12 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| MW13 | GT | | 1.00 | 5.97 | 8.60 | 5.00 | 2.10 | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| MW14 | BR | | 1.00 | 2.93 | 1.20 | 1.10 | 0.35 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| MW21 | BR | | 0.20 J | 0.20 J | 1.00 U | 0.25 J | 0.25 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| MW22 | BR | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW23 | BR | | 0.30 J | 0.50 J | 0.53 J | 0.73 J | 0.44 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R1-82 | BR | | 1.00 U | 1.00 U | 1.00 U | NS | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | 1.00 U |
| R1-94 | BR | | 1.00 U | 1.00 U | NS | NS | NS | 1.00 U | 1.00 U | NS | NS | NS |
| R1-102 | BR | | 3.00 | 0.64 J | 0.80 J | 0.80 J | 0.82 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R1-103 | BR | | 0.20 J | 1.00 UJ | 1.00 U | 0.26 J | 0.36 J | 1.00 U | 1.00 UJ | 1.00 U | 1.00 U | 1.00 U |
| R1-105 | BR | | 0.20 J | NS | 1.00 U | 0.35 J | 0.37 J | 1.00 U | NS | 1.00 U | 1.00 U | 1.00 U |
| R1-109 | BR | | 0.20 J | 1.00 U | 1.00 U | 1.00 U | 0.33 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R1-110 | BR | | 0.40 J | 0.30 J | 0.38 J | 0.43 J | 0.30 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R1-110-2 | BR | | 0.40 J | 0.40 J | 0.65 J | 0.61 J | 0.45 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R1-111 | BR | | 0.30 J | NS | 1.00 U | 1.00 U | 0.32 J | 1.00 U | NS | 1.00 U | 1.00 U | 1.00 U |
| R1-116 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R2-15 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R2-23 | BR | | 1.00 U | 1.00 U | 1.00 U | NS | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | 1.00 U |
| ON3 | BR | | 0.70 J | 1.35 | 1.10 | 1.30 | 0.54 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

Meets or exceeds MCL.

NS - Not sampled.

U - Less than the detection limit provided.

J - Indicates sample results between the MDL and CRDL.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

GT - Glacial Till.

BR - Bedrock.

TABLE 5-1
MWSP GROUNDWATER SAMPLING RESULTS
VOLATILE ORGANIC COMPOUNDS OF CONCERN
2007 - 2011
TOBYHANNA ARMY DEPOT

| | | Analyte: | Vinyl Chloride | | | | | PCE | | | | |
|----------|---------|----------|----------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | MCL: | 2 | | | | | 5 | | | | |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 | 2007 | 2008 | 2009 | 2010 | 2011 |
| MW01 | BR | | 1.00 | 1.57 | 13.00 | 2.40 | 2.20 | 0.20 J | 0.20 J | 1.00 U | 0.19 J | 0.17 J |
| MW02 | GT | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW05 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 0.70 J | 0.92 J | 1.30 | 1.10 | 0.71 J |
| MW11 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 8.00 | 11.30 | 17.00 | 20.00 | 14.00 |
| MW12 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 2.00 | 2.28 | 1.80 | 2.20 | 2.30 |
| MW13 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 0.90 J | 3.73 | 2.70 | 5.80 | 2.90 |
| MW14 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 | 2.56 | 2.00 | 2.30 | 1.30 |
| MW21 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 0.80 J | 0.85 J | 3.00 | 2.70 | 0.66 J |
| MW22 | BR | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW23 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 3.00 | 4.43 | 5.20 | 4.30 | 3.60 |
| R1-82 | BR | | 1.00 U | 1.00 U | 1.00 U | NS | 1.00 U | 0.20 J | 0.30 J | 0.46 J | NS | 0.31 J |
| R1-94 | BR | | 10.00 | 1.00 U | NS | NS | NS | 1.00 U | 1.00 U | NS | NS | NS |
| R1-102 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 2.64 | 2.90 | 2.90 | 1.70 |
| R1-103 | BR | | 1.00 U | 1.00 UJ | 1.00 U | 1.00 U | 1.00 U | 2.00 | 1.79 J | 2.80 | 2.20 | 1.10 |
| R1-105 | BR | | 1.00 U | NS | 1.00 U | 1.00 U | 1.00 U | 1.00 | NS | 1.60 | 3.10 | 2.40 |
| R1-109 | BR | | 1.00 U | 1.00 U | 1.00 U | 0.29 J | 1.00 U | 0.70 J | 0.30 J | 3.30 | 3.30 | 0.23 J |
| R1-110 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 | 1.52 | 2.10 | 2.10 | 1.60 |
| R1-110-2 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 | 1.01 | 1.80 | 1.70 | 1.10 |
| R1-111 | BR | | 1.00 U | NS | 1.00 U | 1.00 U | 1.00 U | 0.90 J | NS | 1.00 U | 1.50 | 0.61 J |
| R1-116 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R2-15 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 0.60 J | 0.63 J | 1.00 U | 0.64 J | 0.43 J |
| R2-23 | BR | | 1.00 U | 1.00 U | 1.00 U | NS | 1.00 U | 0.10 J | 0.20 J | 0.21 J | NS | 1.00 U |
| ON3 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

Meets or exceeds MCL.

NS - Not sampled.

U - Less than the detection limit provided.

J - Indicates sample results between the MDL and CRDL.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

GT - Glacial Till.

BR - Bedrock.

TABLE 5-1
MWSP GROUNDWATER SAMPLING RESULTS
VOLATILE ORGANIC COMPOUNDS OF CONCERN
2007 - 2011
TOBYHANNA ARMY DEPOT

| | | Analyte: | TCE | | | | |
|----------|---------|----------|--------|--------|--------|--------|--------|
| | | MCL: | 5 | | | | |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| MW01 | BR | | 4.00 | 5.57 | 8.70 | 4.50 | 3.50 |
| MW02 | GT | | NS | NS | NS | NS | NS |
| MW05 | BR | | 2.00 | 2.58 | 3.10 | 3.10 | 2.20 |
| MW11 | GT | | 5.00 | 5.78 | 5.80 | 7.10 | 4.50 |
| MW12 | GT | | 1.00 U | 0.53 J | 1.00 U | 1.00 U | 1.00 U |
| MW13 | GT | | 1.00 | 6.59 | 7.90 | 8.90 | 4.00 |
| MW14 | BR | | 2.00 | 5.33 | 2.90 | 3.10 | 1.70 |
| MW21 | BR | | 2.00 | 3.21 | 9.70 | 10.00 | 2.40 |
| MW22 | BR | | NS | NS | NS | NS | NS |
| MW23 | BR | | 8.00 | 15.00 | 15.00 | 15.00 | 11.00 |
| R1-82 | BR | | 0.70 J | 1.33 | 1.30 | NS | 0.79 J |
| R1-94 | BR | | 1.00 U | 0.40 J | NS | NS | NS |
| R1-102 | BR | | 0.70 J | 7.07 | 8.00 | 7.80 | 5.10 |
| R1-103 | BR | | 3.00 | 2.15 J | 6.20 | 4.40 | 0.59 J |
| R1-105 | BR | | 3.00 | NS | 1.60 | 6.30 | 5.40 |
| R1-109 | BR | | 2.00 | 2.53 | 3.80 | 5.20 | 0.92 J |
| R1-110 | BR | | 3.00 | 3.87 | 4.30 | 4.10 | 3.30 |
| R1-110-2 | BR | | 3.00 | 2.56 | 4.20 | 4.20 | 2.90 |
| R1-111 | BR | | 2.00 | NS | 1.00 U | 2.20 | 1.60 |
| R1-116 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R2-15 | BR | | 0.50 J | 1.13 | 1.00 U | 1.20 | 0.77 J |
| R2-23 | BR | | 0.30 J | 0.88 J | 0.70 J | NS | 0.45 J |
| ON3 | BR | | 2.00 | 3.41 | 3.70 | 3.40 | 1.90 |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

Meets or exceeds MCL.

NS - Not sampled.

U - Less than the detection limit provided.

J - Indicates sample results between the MDL and CRDL.

UJ - The analyte was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

GT - Glacial Till.

BR - Bedrock.

**TABLE 5-2
HISTORIC MWSP GROUNDWATER SAMPLING RESULTS FOR TCE
TOBYHANNA ARMY DEPOT**

| WELL ID | Aquifer | Apr-01 (µg/L) | Oct-01 (µg/L) | Apr-02 (µg/L) | Oct-02 (µg/L) | Apr-03 (µg/L) | Oct-03 (µg/L) | Apr-04 (µg/L) | Oct-04 (µg/L) | Apr-05 (µg/L) | Oct-05 (µg/L) | Apr-06 (µg/L) | Oct-06 (µg/L) | Apr-07 (µg/L) | Dec-08 (µg/L) | Nov-09 (µg/L) | Nov-10 (µg/L) | Nov-11 (µg/L) |
|----------|---------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| MCL | | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| MW01 | BR | 26.00 | 30.00 | 11.00 | 6.70 | 5.30 | 4.70 | 14.00 | 6.40 | 7.00 | 6.00 | 7.00 | 7.00 J | 4.00 | 5.57 | 8.70 | 4.50 | 3.50 |
| MW02 | GT | 1.00 U | 0.16 J | 1.00 U | 0.10 J | 1.40 | 0.43 | 1.00 U | 1.40 | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW03 | GT | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW05 | BR | 2.40 | 2.50 | 3.70 | 2.40 | 2.10 | 3.00 | 5.00 | 3.80 | 4.00 J | 4.00 J | 4.00 L | 3.00 | 2.00 | 2.58 | 3.10 | 3.10 | 2.20 |
| MW07 | BR | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW08 | GT | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW11 | GT | 8.50 | 8.50 | 8.10 | 8.10 | 8.10 | 6.10 | 8.10 | 7.80 | 7.00 | 7.00 | 6.00 | 7.00 | 5.00 | 5.78 | 5.80 | 7.10 | 4.50 |
| MW12 | GT | 4.70 | NS | NS | 0.28 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 0.20 J | 0.60 B | 0.80 J | 1.00 U | 0.53 J | 1.00 U | 1.00 U | 1.00 U |
| MW13 | GT | 2.60 | 8.10 | 5.80 | 11.00 | 0.89 J | 1.00 | 1.30 | 2.70 | 3.00 J | 5.00 | 0.80 J | 6.00 | 1.00 | 6.59 | 7.90 | 8.90 | 4.00 |
| MW14 | BR | 2.10 | 2.40 | 2.00 | 1.60 | 2.70 | 3.00 | 3.40 | 3.20 | 3.00 J | 8.00 J | 2.00 J | 4.00 | 2.00 | 5.33 | 2.90 | 3.10 | 1.70 |
| MW17 | BR | 1.00 U | NS | 5.30 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW18 | GT | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW19 | BR | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW21 | BR | 4.90 | 4.10 | NS | 3.70 | 3.80 | 3.80 | 7.10 | 4.30 | 4.00 J | 4.00 J | 5.00 | 7.00 | 2.00 | 3.21 | 9.70 | 10.00 | 2.40 |
| MW22 | BR | 2.10 | 0.80 J | 1.90 | 1.50 | 1.60 | 2.60 | 1.10 | 2.60 | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW23 | BR | 4.70 | 4.30 | 4.60 | 3.50 | 11.00 | 13.00 | 22.00 | 4.50 | 19.00 | 16.00 | 16.00 | 21.00 | 8.00 | 15.00 | 15.00 | 15.00 | 11.00 |
| R1-82 | BR | 1.30 | 1.30 | 1.50 | 1.30 | 0.92 J | 1.20 | 1.30 | 1.00 U | 1.00 J | NS | 1.00 | NS | 0.70 J | 1.33 | 1.30 | NS | 0.79 J |
| R1-94 | BR | 0.41 J | 0.43 J | 0.50 J | 0.43 J | 0.26 J | 0.21 J | 1.00 U | 1.00 U | 5.00 U | NS | 0.20 J | NS | 1.00 U | 0.40 J | NS | NS | NS |
| R1-102 | BR | 3.60 | 2.70 | 2.20 | 1.70 | 0.52 J | 0.83 J | 10.00 | 1.00 U | NS | 9.00 | NS | 9.00 | 0.70 J | 7.07 | 8.00 | 7.80 | 5.10 |
| R1-103 | BR | 4.20 | 6.10 | 3.40 | 7.40 | 2.30 | 6.60 | 8.70 | 2.00 | NS | 9.00 | NS | 6.00 | 3.00 | 2.15 | 6.20 | 4.40 | 0.59 J |
| R1-105 | BR | 6.20 | 5.00 | 6.40 | 5.20 | 5.10 | 4.90 | NS | 4.80 | NS | 5.00 | NS | 9.00 | 3.00 | NS | 1.60 | 6.30 | 5.40 |
| R1-109 | BR | 0.87 J | 3.00 | 2.40 | 3.60 | 2.40 | 5.60 | 5.10 | 1.00 U | NS | 3.00 | NS | 1.00 | 2.00 | 2.53 | 3.80 | 5.20 | 0.92 J |
| R1-110 | BR | 5.40 | 4.60 | 4.70 | 5.00 | 4.10 | 5.20 | 5.90 | 5.30 | NS | 5.00 | NS | 5.00 | 3.00 | 3.87 | 4.30 | 4.10 | 3.30 |
| R1-110-2 | BR | 0.24 J | 0.07 J | 0.64 J | 0.11 J | 1.00 U | 1.00 U | 6.10 | 2.50 | NS | 5.00 | NS | 5.00 | 3.00 | 2.56 | 4.20 | 4.20 | 2.90 |
| R1-111 | BR | 2.30 | 2.50 | 2.20 | 2.10 | 2.00 | 2.30 | 2.90 | 1.00 U | 3.00 J | 3.00 | 2.00 | 3.00 | 2.00 | NS | 1.00 U | 2.20 | 1.60 |
| R1-116 | BR | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 B | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R2-15 | BR | 1.30 | 1.30 | 0.72 J | 1.10 | 1.00 | 3.30 | 1.40 | 1.40 | 1.00 J | 2.00 | 1.00 J | 1.00 | 0.50 J | 1.13 | 1.00 U | 1.20 | 0.77 J |
| R2-23 | BR | 0.75 J | 0.86 J | 0.90 J | 0.80 J | 0.65 J | 0.59 J | 1.00 | 1.30 | 1.00 J | NS | 0.50 B | NS | 0.30 J | 0.88 J | 0.70 J | NS | 0.45 J |
| ON3 | BR | 3.40 | 4.00 | 3.60 | 3.60 | 2.90 | 3.10 | 2.90 | 3.00 | NS | 4.00 | NS | 3.00 J | 2.00 | 3.41 | 3.70 | 3.40 | 1.90 |

Notes:

µg/L - micrograms per liter.

MCL - Safe Drinking Water Act Maximum Contaminant Level.

Meets or exceeds MCL

BR - Bedrock Aquifer

GT - Glacial Till Aquifer

NS - Not sampled

U - Less than the detection limit provided.

J - Indicates sample results between the Method Detection Limit (MDL) and Contract Required Detection Limit (CRDL).

B - Detected in blank sample.

L - Results biased low.

**TABLE 5-3
HISTORIC MWSP GROUNDWATER SAMPLING RESULTS FOR PCE
TOBYHANNA ARMY DEPOT**

| WELL ID | Aquifer | Apr-01 (µg/L) | Oct-01 (µg/L) | Apr-02 (µg/L) | Oct-02 (µg/L) | Apr-03 (µg/L) | Oct-03 (µg/L) | Apr-04 (µg/L) | Oct-04 (µg/L) | Apr-05 (µg/L) | Oct-05 (µg/L) | Apr-06 (µg/L) | Oct-06 (µg/L) | Apr-07 (µg/L) | Dec-08 (µg/L) | Nov-09 (µg/L) | Nov-10 (µg/L) | Nov-11 (µg/L) |
|----------|---------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| MCL | | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| MW01 | BR | 0.39 J | 0.33 J | 0.37 J | 0.14 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 0.70 J | 0.30 J | 0.10 J | 0.20 J | 0.20 J | 1.00 U | 0.19 J | 0.17 J |
| MW02 | GT | 0.27 J | 0.30 J | 0.30 J | 0.35 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW03 | GT | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW05 | BR | 0.61 J | 0.67 J | 1.40 | 0.73 J | 0.63 J | 1.10 | 2.60 | 2.00 | 2.00 J | 5.00 | 1.00 L | 1.00 | 0.70 J | 0.92 J | 1.30 | 1.10 | 0.71 J |
| MW07 | BR | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW08 | GT | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW11 | GT | 19.00 | 26.00 | 30.00 | 35.00 | 24.00 | 16.00 | 17.00 | 24.00 | 22.00 | 16.00 | 13.00 | 13.00 | 8.00 | 11.30 | 17.00 | 20.00 | 14.00 |
| MW12 | GT | 1.10 | NS | NS | 1.00 J | 1.70 | 0.75 | 1.00 U | 1.80 | 5.00 U | 3.00 | 2.00 L | 2.00 | 2.00 | 2.28 | 1.80 | 2.20 | 2.30 |
| MW13 | GT | 2.00 | 4.40 | 3.60 | 4.90 | 0.86 | 0.96 J | 1.50 | 2.20 | 1.00 J | 2.00 | 0.60 J | 3.00 | 0.90 J | 3.73 | 2.70 | 5.80 | 2.90 |
| MW14 | BR | 0.96 J | 1.10 J | 0.99 J | 0.78 J | 1.50 | 1.50 | 2.20 | 2.00 | 2.00 J | 4.00 | 1.00 J | 2.00 | 1.00 | 2.56 | 2.00 | 2.30 | 1.30 |
| MW17 | BR | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW18 | GT | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW19 | BR | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW21 | BR | 1.10 | 0.98 J | 1.40 | 0.99 J | 1.00 | 1.10 | 2.30 | 1.60 | 1.00 J | 2.00 | 1.00 | 2.00 | 0.80 J | 0.85 J | 3.00 | 2.70 | 0.66 J |
| MW22 | BR | 1.00 U | 1.00 U | 0.18 J | 0.14 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| MW23 | BR | 1.10 | 0.99 J | 1.10 | 0.88 J | 3.10 | 3.40 | 7.60 | 1.60 | 5.00 U | 5.00 | 5.00 | 5.00 | 3.00 | 4.43 | 5.20 | 4.30 | 3.60 |
| R1-82 | BR | 0.28 J | 0.34 J | 0.36 J | 0.37 J | 0.23 J | 0.32 J | 1.00 U | 1.00 U | 5.00 U | NS | 0.30 J | NS | 0.20 J | 0.30 J | 0.46 J | NS | 0.31 J |
| R1-94 | BR | 1.00 U | 1.00 U | 0.10 J | 0.13 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | NS | 1.00 U | NS | 1.00 U | 1.00 U | NS | NS | NS |
| R1-102 | BR | 1.50 | 1.00 | 1.00 | 0.92 J | 0.53 J | 0.60 J | 4.40 | 0.56 J | NS | 4.00 | NS | 3.00 | 1.00 U | 2.64 | 2.90 | 2.90 | 1.70 |
| R1-103 | BR | 1.70 | 1.80 | 1.60 | 2.30 | 1.60 | 2.00 | 3.00 | 2.60 | NS | 4.00 | NS | 3.00 | 2.00 | 1.79 | 2.80 | 2.20 | 1.10 |
| R1-105 | BR | 2.10 | 1.60 | 2.40 | 2.00 | 2.10 | 1.60 | NS | 2.20 | NS | 2.00 | NS | 4.00 | 1.00 | NS | 1.60 | 3.10 | 2.40 |
| R1-109 | BR | 0.80 J | 1.30 | 1.50 | 1.50 | 0.84 J | 0.57 J | 1.90 | 1.00 U | NS | 1.00 | NS | 0.30 J | 0.70 J | 0.30 J | 3.30 | 3.30 | 0.23 J |
| R1-110 | BR | 2.00 | 1.60 | 1.70 | 2.50 | 1.90 | 2.70 | 3.10 | 3.20 | NS | 2.00 | NS | 2.00 | 1.00 | 1.52 | 2.10 | 2.10 | 1.60 |
| R1-110-2 | BR | 0.21 J | 0.23 J | 0.42 J | 0.28 J | 1.00 U | 1.00 U | 2.90 | 1.20 | NS | 2.00 | NS | 2.00 | 1.00 | 1.01 | 1.80 | 1.70 | 1.10 |
| R1-111 | BR | 1.00 J | 1.30 | 0.90 J | 1.10 | 0.90 J | 0.84 J | 1.30 | 1.00 U | 5.00 U | 1.00 | 1.00 J | 1.00 | 0.90 J | NS | 1.00 U | 1.50 | 0.61 J |
| R1-116 | BR | 0.20 J | 0.16 J | 0.15 J | 0.13 J | NS | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 0.20 J | 0.10 J | 0.10 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| R2-15 | BR | 2.00 | 1.60 | 1.90 | 2.20 | 2.40 | 0.75 | 3.50 | 3.30 | 3.00 J | 1.00 | 1.00 J | 0.90 J | 0.60 J | 0.63 J | 1.00 U | 0.64 J | 0.43 J |
| R2-23 | BR | 1.00 U | 0.18 J | 0.21 J | 0.27 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | NS | 0.20 J | NS | 0.10 J | 0.20 J | 0.21 J | NS | 1.00 U |
| ON3 | BR | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | 0.90 J | NS | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |

Notes:

µg/L - micrograms per liter.

MCL - Safe Drinking Water Act Maximum Contaminant Level.

Meets or exceeds MCL

BR - Bedrock Aquifer

GT - Glacial Till Aquifer

NS - Not sampled

U - Less than the detection limit provided.

J - Indicates sample results between the Method Detection Limit (MDL) and Contract Required Detection Limit (CRDL).

L - Results biased low.

Table 5-4
Mann Kendall Analysis Results
OU-1 Groundwater

| Chemical and Well ID | Area and Geologic Unit | Number of Events | Minimum (µg/L) | Median (µg/L) | Maximum (µg/L) | Mann Kendall Statistic (S) | Standardized Test Statistic (Z) | Confidence Factor (1-p) % | Trend (95% level of significance) |
|----------------------|------------------------|------------------|----------------|---------------|----------------|----------------------------|---------------------------------|---------------------------|-----------------------------------|
| TCE | | | | | | | | | |
| MW01 | Area A - BR | 17 | 3.5 | 6.7 | 30 | -59 | -2.397 | 99.1% | Decreasing |
| MW11 | Area B - GT | 17 | 4.5 | 7 | 8.5 | -92 | -3.792 | 100.0% | Decreasing |
| MW13 | Area B - GT | 17 | 0.8 | 4 | 11 | 23 | 0.907 | 80.4% | No Trend |
| MW23 | Area B - BR | 17 | 3.5 | 13 | 22 | 37 | 1.49 | 92.4% | No Trend |
| R1-82 | Area B - BR | 14 | 0.7 | 1.25 | 1.5 | -28 | -1.525 | 93.7% | No Trend |
| R1-102 | Area B - BR | 15 | 0.52 | 3.6 | 10 | 12 | 0.545 | 72.1% | No Trend |
| R1-105 | Area B - BR | 13 | 1.6 | 5.1 | 9 | -15 | -0.856 | 78.2% | No Trend |
| R1-110 | Area B - BR | 15 | 3 | 4.7 | 5.9 | -39 | -1.891 | 97.1% | Decreasing |
| PCE | | | | | | | | | |
| MW01 | Area A - BR | 17 | 0.1 | 0.37 | 1 | -34 | -1.395 | 91.2% | No Trend |
| MW11 | Area B - GT | 17 | 8 | 17 | 35 | -64 | -2.604 | 99.6% | Decreasing |
| MW13 | Area B - GT | 17 | 0.6 | 2.2 | 5.8 | 11 | 0.412 | 64.2% | No Trend |
| MW23 | Area B - BR | 17 | 0.88 | 3.6 | 7.6 | 51 | 2.077 | 97.9% | Increasing |
| R1-82 | Area B - BR | 14 | 0.2 | 0.33 | 5 | 5 | 0.22 | 58.5% | No Trend |
| R1-102 | Area B - BR | 15 | 0.53 | 1.5 | 4.4 | 19 | 0.896 | 81.0% | No Trend |
| R1-105 | Area B - BR | 13 | 1 | 2.1 | 4 | 8 | 0.432 | 66.2% | No Trend |

Notes:

GT - Glacial Till

BR - Bedrock

TABLE 5-5
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
VOLATILE ORGANIC COMPOUNDS OF CONCERN
2007 - 2011

| WELL ID | Aquifer | Analyte: | Benzene | Benzene | Benzene | Benzene | Benzene |
|---------|---------|----------|---------|---------|---------|---------|---------|
| | | MCL: | 5 | 5 | 5 | 5 | 5 |
| | | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF10 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF11 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF12 | BR | | 0.10 J | 0.10 U | 1.00 U | 0.11 J | 0.35 J |
| LF13 | GT | | NS | NS | NS | NS | NS |
| LF19 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF21 | GT | | 1.00 UJ | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF22 | GT | | 3.00 | 1.15 | 0.99 J | 1.30 | 4.20 |
| LF23 | GT | | 3.00 | 5.38 | 5.40 | 6.40 | 2.60 |
| LF24 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF25 | BR | | 0.30 J | 0.80 J | 0.70 J | 1.20 | 0.15 J |
| LF26 | GT | | 0.30 J | 0.86 J | 0.96 J | 1.00 | 0.72 J |
| LF27 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF28 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF29 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled for VOCs.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

B - The analyte was found in the associated method blank as well as in the sample, indicate probable blank contamination.

1,2-DCP = 1,2-dichloropropane

TABLE 5-5
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
VOLATILE ORGANIC COMPOUNDS OF CONCERN
2007 - 2011

| WELL ID | Aquifer | Analyte: | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride |
|---------|---------|----------|----------------|----------------|----------------|----------------|----------------|
| | | MCL: | 2 | 2 | 2 | 2 | 2 |
| | | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF10 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF11 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF12 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF13 | GT | | NS | NS | NS | NS | NS |
| LF19 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF21 | GT | | 1.00 UJ | 1.00 UJ | 1.00 U | 1.00 U | 1.00 U |
| LF22 | GT | | 0.40 J | 0.40 J | 0.35 J | 0.64 J | 0.42 J |
| LF23 | GT | | 2.00 | 0.69 J | 1.20 | 1.60 | 1.50 |
| LF24 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF25 | BR | | 1.00 | 4.00 | 5.60 | 9.70 | 2.10 |
| LF26 | GT | | 0.40 J | 1.00 U | 0.29 J | 0.40 J | 0.33 J |
| LF27 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF28 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF29 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled for VOCs.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

B - The analyte was found in the associated method blank as well as in the sample, indicateig probable blank contamination.

1,2-DCP = 1,2-dichloropropane

TABLE 5-5
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
VOLATILE ORGANIC COMPOUNDS OF CONCERN
2007 - 2011

| WELL ID | Aquifer | Analyte: | 1,2-DCP | 1,2-DCP | 1,2-DCP | 1,2-DCP | 1,2-DCP |
|---------|---------|----------|---------|---------|---------|---------|---------|
| | | MCL: | 5 | 5 | 5 | 5 | 5 |
| | | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF10 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF11 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF12 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF13 | GT | | NS | NS | NS | NS | NS |
| LF19 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF21 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF22 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF23 | GT | | 1.00 | 1.33 | 0.71 J | 0.78 J | 0.46 J |
| LF24 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF25 | BR | | 1.00 U | 0.60 J | 0.67 J | 1.1 | 0.13 J |
| LF26 | GT | | 1.00 U | 1.00 U | 0.19 J | 0.18 J | 0.16 J |
| LF27 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF28 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF29 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled for VOCs.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

B - The analyte was found in the associated method blank as well as in the sample, indicateig probable blank contamination.

1,2-DCP = 1,2-dichloropropane

TABLE 5-5
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
VOLATILE ORGANIC COMPOUNDS OF CONCERN
2007 - 2011

| WELL ID | Aquifer | Analyte: | PCE | | PCE | | PCE | | PCE | | PCE | |
|---------|---------|----------|------|---|------|---|-------|---|------|---|-------|---|
| | | MCL: | 5 | | 5 | | 5 | | 5 | | 5 | |
| | | Date: | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | |
| LF10 | BR | | 3.00 | | 6.53 | | 7.60 | | 6.50 | | 6.70 | |
| LF11 | BR | | 5.00 | | 7.47 | | 10.00 | | 9.70 | | 7.70 | |
| LF12 | BR | | 3.00 | | 4.47 | | 5.30 | | 5.00 | | 2.50 | |
| LF13 | GT | | NS | | NS | | NS | | NS | | NS | |
| LF19 | BR | | 8.00 | | 9.90 | | 13.00 | | 9.80 | | 11.00 | |
| LF21 | GT | | 2.00 | J | 2.50 | | 3.50 | | 3.00 | | 2.40 | |
| LF22 | GT | | 1.00 | U | 1.00 | U | 1.00 | U | 1.00 | U | 1.00 | U |
| LF23 | GT | | 1.00 | U | 1.00 | U | 1.00 | U | 1.00 | U | 1.00 | U |
| LF24 | GT | | 1.00 | U | 1.00 | U | 1.00 | U | 1.00 | U | 1.00 | U |
| LF25 | BR | | 0.10 | J | 0.30 | B | 0.31 | J | 0.22 | J | 0.20 | J |
| LF26 | GT | | 1.00 | | 1.00 | U | 0.43 | J | 0.27 | J | 0.74 | J |
| LF27 | BR | | 0.70 | J | 1.45 | | 2.00 | | 1.60 | | 1.00 | |
| LF28 | GT | | 0.40 | J | 0.50 | J | 0.76 | J | 0.74 | J | 0.56 | J |
| LF29 | BR | | 0.30 | J | 0.50 | J | 0.80 | J | 0.69 | J | 0.20 | J |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled for VOCs.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

B - The analyte was found in the associated method blank as well as in the sample, indicateig probable blank contamination.

1,2-DCP = 1,2-dichloropropane

TABLE 5-5
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
VOLATILE ORGANIC COMPOUNDS OF CONCERN
2007 - 2011

| WELL ID | Aquifer | Analyte: | TCE | TCE | TCE | TCE | TCE |
|---------|---------|----------|--------|--------|--------|--------|--------|
| | | MCL: | 5 | 5 | 5 | 5 | 5 |
| | | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF10 | BR | | 6.00 | 14.30 | 15.00 | 11.00 | 18.00 |
| LF11 | BR | | 10.00 | 16.50 | 22.00 | 19.00 | 18.00 |
| LF12 | BR | | 4.00 | 8.65 | 10.00 | 11.00 | 5.80 |
| LF13 | GT | | NS | NS | NS | NS | NS |
| LF19 | BR | | 18.00 | 23.30 | 27.00 | 19.00 | 27.00 |
| LF21 | GT | | 4.00 J | 5.29 J | 6.60 | 6.10 | 5.80 |
| LF22 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF23 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF24 | GT | | 1.00 U | 1.00 U | 1.00 U | 0.16 J | 1.00 U |
| LF25 | BR | | 0.20 J | 0.70 J | 0.53 J | 0.40 J | 1.00 U |
| LF26 | GT | | 1.00 | 1.24 | 1.70 | 1.70 | 2.20 |
| LF27 | BR | | 0.90 J | 2.52 | 3.70 | 3.60 | 2.10 |
| LF28 | GT | | 0.50 J | 0.80 J | 1.20 | 1.20 | 1.00 |
| LF29 | BR | | 0.70 J | 1.13 | 1.70 | 1.70 | 0.50 J |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled for VOCs.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

B - The analyte was found in the associated method blank as well as in the sample, indicateig probable blank contamination.

1,2-DCP = 1,2-dichloropropane

**TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011**

| | | Analyte: | Cyanide | | Cyanide | | Cyanide | | Cyanide | | Cyanide | |
|---------|---------|----------|---------|---|---------|---|---------|----|---------|----|---------|---|
| | | MCL: | 200 | | 200 | | 200 | | 200 | | 200 | |
| WELL ID | Aquifer | Date: | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | |
| LF12 | BR | | NS | | NS | | NS | | NS | | NS | |
| LF13 | GT | | 5.00 | U | 5.00 | U | 7.20 | BJ | 4.40 | BJ | 10.00 | U |
| LF22 | GT | | 5.00 | U | 5.00 | U | 5.40 | BJ | 5.10 | BJ | 10.00 | U |
| LF23 | GT | | 5.00 | U | 5.00 | U | 1.60 | BJ | 20.90 | J | 10.00 | U |
| LF24 | GT | | 5.00 | U | 5.00 | U | 10.00 | U | 10.50 | J | 10.00 | U |
| LF26 | GT | | 5.00 | U | 5.00 | U | 5.30 | BJ | 2.50 | J | 10.00 | U |
| LF27 | BR | | 5.00 | U | 5.00 | U | 10.00 | U | 10.00 | U | 10.00 | U |
| LF28 | GT | | 5.00 | U | 5.00 | U | 2.40 | BJ | 10.00 | U | 10.00 | U |
| LF29 | BR | | 5.00 | U | 5.00 | U | 10.00 | U | 10.00 | U | 10.00 | U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

**TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011**

| | | Analyte: | Total Mercury | Total Mercury | Total Mercury | Total Mercury | Total Mercury |
|---------|---------|----------|------------------|------------------|------------------|------------------|------------------|
| | | MCL: | 2 | 2 | 2 | 2 | 2 |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF12 | BR | | NS | NS | NS | NS | NS |
| LF13 | GT | | 0.10 U | 0.20 UJ | 0.20 U | 0.04 J | 0.20 U |
| LF22 | GT | | 0.10 U | 0.20 UJ | 0.20 U | 0.20 U | 0.20 U |
| LF23 | GT | | 0.10 U | 0.20 UJ | 0.20 U | 0.20 U | 0.20 U |
| LF24 | GT | | 0.23 J | 0.32 J | 0.35 | 0.41 | 0.43 |
| LF26 | GT | | 0.31 | 0.68 J | 0.12 J | 0.17 J | 0.14 J |
| LF27 | BR | | 0.12 J | 0.29 J | 0.27 | 0.30 | 0.34 |
| LF28 | GT | | 0.10 J | 0.18 J | 0.21 | 0.26 | 0.30 |
| LF29 | BR | | 0.12 J | 0.39 J | 0.38 | 0.42 | 0.59 |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

**TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011**

| | | Analyte: | Dissolved Mercury | Dissolved Mercury | Dissolved Mercury | Dissolved Mercury | Dissolved Mercury |
|---------|---------|----------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | | MCL: | 2 | 2 | 2 | 2 | 2 |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF12 | BR | | NS | NS | NS | NS | NS |
| LF13 | GT | | 0.10 U | 0.20 UJ | 0.20 U | 0.05 J | 0.20 U |
| LF22 | GT | | 0.10 U | 0.20 UJ | 0.20 U | 0.05 J | 0.20 U |
| LF23 | GT | | 0.10 U | 0.20 UJ | 0.20 U | 0.20 U | 0.20 U |
| LF24 | GT | | 0.19 J | 0.29 J | 0.34 | 0.43 | 0.30 |
| LF26 | GT | | 0.18 J | 0.34 J | 0.08 J | 0.24 | 0.07 J |
| LF27 | BR | | 0.10 U | 0.24 J | 0.38 | 0.31 | 0.33 |
| LF28 | GT | | 0.10 U | 0.15 J | 0.18 J | 0.23 | 0.24 |
| LF29 | BR | | 0.14 J | 0.36 J | 0.39 | 0.44 | 0.59 |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

**TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011**

| | | Analyte: | Total Arsenic | Total Arsenic | Total Arsenic | Total Arsenic | Total Arsenic |
|---------|---------|----------|---------------|---------------|---------------|---------------|---------------|
| | | MCL: | 10 | 10 | 10 | 10 | 10 |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF12 | BR | | NS | NS | NS | NS | NS |
| LF13 | GT | | 19.00 J | 25.00 | 22.90 | 18.90 | 31.00 |
| LF22 | GT | | 36.40 | 37.60 | 41.80 | 33.40 | 29.00 |
| LF23 | GT | | 79.70 | 115.00 | 117.00 | 118.00 | 80.00 |
| LF24 | GT | | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U |
| LF26 | GT | | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U |
| LF27 | BR | | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U |
| LF28 | GT | | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U |
| LF29 | BR | | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

**TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011**

| | | Analyte: | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | |
|---------|---------|----------|-------------------|--|-------------------|--|-------------------|--|-------------------|--|-------------------|--|
| | | MCL: | 10 | | 10 | | 10 | | 10 | | 10 | |
| WELL ID | Aquifer | Date: | 2007 | | 2008 | | 2009 | | 2010 | | 2011 | |
| LF12 | BR | | NS | | NS | | NS | | NS | | NS | |
| LF13 | GT | | 19.20 J | | 24.00 | | 22.00 | | 21.30 | | 36.00 | |
| LF22 | GT | | 33.70 | | 36.40 | | 37.70 | | 35.10 | | 42.00 | |
| LF23 | GT | | 84.30 | | 118.00 | | 105.00 | | 118.00 | | 86.00 | |
| LF24 | GT | | 5.00 U | | 15.00 U | | 10.00 U | | 10.00 U | | 10.00 U | |
| LF26 | GT | | 5.00 U | | 15.00 U | | 10.00 U | | 10.00 U | | 10.00 U | |
| LF27 | BR | | 5.00 U | | 15.00 U | | 10.00 U | | 10.00 U | | 10.00 U | |
| LF28 | GT | | 5.00 U | | 15.00 U | | 10.00 U | | 10.00 U | | 10.00 U | |
| LF29 | BR | | 5.00 U | | 15.00 U | | 10.00 U | | 10.00 U | | 10.00 U | |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

**TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011**

| | | Analyte: | Total Barium | Total Barium | Total Barium | Total Barium | Total Barium |
|---------|---------|----------|--------------|--------------|--------------|--------------|--------------|
| | | MCL: | 2000 | 2000 | 2000 | 2000 | 2000 |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF12 | BR | | NS | NS | NS | NS | NS |
| LF13 | GT | | 493.00 | 637.00 | 649.00 | 606.00 | 610.00 |
| LF22 | GT | | 1070.00 | 945.00 | 1050.00 | 967.00 | 1100.00 |
| LF23 | GT | | 1430.00 | 2220.00 | 2340.00 | 2330.00 | 1300.00 |
| LF24 | GT | | 167.00 | 168.00 | 166.00 J | 165.00 J | 150.00 J |
| LF26 | GT | | 43.30 | 54.00 | 62.40 J | 63.00 J | 61.00 J |
| LF27 | BR | | 68.10 | 99.60 | 102.00 J | 97.80 J | 100.00 J |
| LF28 | GT | | 43.20 | 51.00 | 50.50 J | 50.20 J | 54.00 J |
| LF29 | BR | | 85.50 | 94.10 | 109.00 J | 105.00 J | 110.00 J |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011

| | | Analyte: | Dissolved Barium | Dissolved Barium | Dissolved Barium | Dissolved Barium | Dissolved Barium |
|---------|---------|----------|------------------|------------------|------------------|------------------|------------------|
| | | MCL: | 2000 | 2000 | 2000 | 2000 | 2000 |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF12 | BR | | NS | NS | NS | NS | NS |
| LF13 | GT | | 542.00 | 611.00 | 640.00 | 609.00 | 600.00 |
| LF22 | GT | | 1070.00 | 981.00 | 1030.00 | 1020.00 | 1100.00 |
| LF23 | GT | | 1590.00 | 2310.00 | 2120.00 | 2380.00 | 1300.00 |
| LF24 | GT | | 172.00 | 166.00 | 157.00 J | 176.00 J | 160.00 J |
| LF26 | GT | | 44.90 | 53.60 | 59.30 J | 61.70 J | 62.00 J |
| LF27 | BR | | 73.60 | 94.60 | 96.60 J | 105.00 J | 110.00 J |
| LF28 | GT | | 45.50 | 51.50 | 50.90 J | 50.20 J | 58.00 J |
| LF29 | BR | | 79.00 | 92.50 | 101.00 J | 105.00 J | 100.00 J |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

**TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011**

| | | Analyte: | Total Lead | Total Lead | Total Lead | Total Lead | Total Lead |
|---------|---------|----------|------------|------------|------------|------------|------------|
| | | MCL: | 15 | 15 | 15 | 15 | 15 |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF12 | BR | | NS | NS | NS | NS | NS |
| LF13 | GT | | 4.60 J | 10.00 U | 4.20 | 5.40 | 3.00 U |
| LF22 | GT | | 9.10 J | 10.00 U | 10.10 | 4.90 | 1.30 J |
| LF23 | GT | | 3.00 U | 10.00 U | 1.50 J | 2.10 J | 2.70 J |
| LF24 | GT | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |
| LF26 | GT | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |
| LF27 | BR | | 3.20 J | 10.00 U | 3.00 U | 3.00 U | 3.00 U |
| LF28 | GT | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |
| LF29 | BR | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

**TABLE 5-6
TYAD LFWSP
GROUNDWATER SAMPLING RESULTS
SELECTED METALS
2007 - 2011**

| | | Analyte: | Dissolved Lead | Dissolved Lead | Dissolved Lead | Dissolved Lead | Dissolved Lead |
|---------|---------|----------|----------------|----------------|----------------|----------------|----------------|
| | | MCL: | 15 | 15 | 15 | 15 | 15 |
| WELL ID | Aquifer | Date: | 2007 | 2008 | 2009 | 2010 | 2011 |
| LF12 | BR | | NS | NS | NS | NS | NS |
| LF13 | GT | | 3.00 U | 10.00 U | 1.30 J | 2.00 J | 1.50 J |
| LF22 | GT | | 3.00 U | 10.00 U | 3.00 U | 2.20 J | 1.80 J |
| LF23 | GT | | 4.70 J | 10.00 U | 1.30 J | 3.00 U | 2.50 J |
| LF24 | GT | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |
| LF26 | GT | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |
| LF27 | BR | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |
| LF28 | GT | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |
| LF29 | BR | | 3.00 U | 10.00 U | 3.00 U | 3.00 U | 3.00 U |

Notes:

All concentrations are in micrograms per liter (µg/L).

MCL - Safe Drinking Water Act Maximum Contaminant Level.

GT - Glacial Till

BR - Bedrock

NS - Not Sampled.

Meets or exceeds the MCL.

U - Less than the detection limit provided.

J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

TABLE 5-7
HISTORICAL LFWSP GROUNDWATER SAMPLING RESULTS FOR BENZENE
TOBYHANNA ARMY DEPOT

| | | Analyte: | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | Benzene | | |
|---------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|
| | | MCL: | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | | |
| WELL ID | Aquifer | Date: | Apr-01 | Oct-01 | Apr-02 | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Apr-05 | Oct-05 | Apr-06 | Oct-06 | Apr-07 | Dec-08 | Nov-09 | Nov-10 | Nov-11 | |
| LF10 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | |
| LF11 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF12 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 0.30 J | 0.50 J | 0.30 J | 0.10 J | 1.00 U | 1.00 U | 0.11 J | 0.35 J |
| LF16 | BR | | 1.00 U | 1.00 U | 0.76 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS |
| LF19 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF20 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| LF21 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF22 | GT | | 1.00 | 0.57 | 0.71 J | 0.38 J | 1.40 | 2.80 | 5.70 | 2.40 | 7.00 | 2.00 | 2.00 J | 2.00 J | 3.00 | 1.15 | 0.99 J | 1.30 | 4.20 | |
| LF23 | GT | | 5.10 | 4.90 | 5.40 | 6.50 | 3.30 | 2.90 | 3.70 | 4.40 | 4.00 J | 6.00 J | 7.00 J | 5.00 J | 3.00 | 5.38 | 5.40 | 6.40 | 2.60 | |
| LF24 | GT | | 1.00 U | 1.00 | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF25 | BR | | 0.50 J | 0.54 J | 1.60 | 0.85 J | 0.72 J | 8.00 | 1.30 | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 0.60 J | 0.80 J | 0.30 J | 0.80 J | 0.70 J | 1.20 | 0.15 J |
| LF26 | GT | | 0.68 J | 0.11 J | 0.90 J | 1.00 U | 0.60 J | 0.82 J | 0.87 J | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 0.70 J | 1.00 J | 0.30 J | 0.86 J | 0.96 J | 1.00 | 0.72 J |
| LF27 | BR | | 0.37 J | 1.00 U | 0.33 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF28 | GT | | 1.00 U | 0.07 J | 0.15 J | 1.00 U | 0.13 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF29 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |

Notes:
µg/L - micrograms per liter.
MCL - Safe Drinking Water Act Maximum Contaminant Level.
Meets or exceeds the MCL.
NS - Not sampled.
U - Less than the detection limit provided.
J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

TABLE 5-8
HISTORICAL LFWSP GROUNDWATER SAMPLING RESULTS FOR PCE
TOBYHANNA ARMY DEPOT

| | | Analyte: | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | PCE | |
|---------|---------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|--------|
| | | MCL: | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| WELL ID | Aquifer | Date: | Apr-01 | Oct-01 | Apr-02 | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Apr-05 | Oct-05 | Apr-06 | Oct-06 | Apr-07 | Dec-08 | Nov-09 | Nov-10 | Nov-11 |
| LF10 | BR | | 0.55 J | 0.42 J | 0.62 J | 0.42 J | 0.75 J | 3.30 | 6.30 | 6.50 | 6.00 | 7.00 | 6.00 J | 6.00 J | 3.00 | 6.52 | 7.60 | 6.50 | 6.70 |
| LF11 | BR | | 4.30 | 4.10 | 5.40 | 3.10 | 3.50 | 2.60 | 7.70 | 6.90 | 8.00 | 8.00 | 7.00 J | 7.00 J | 5.00 | 7.47 | 10.00 | 9.70 | 7.70 |
| LF12 | BR | | 3.10 | 3.60 | 3.00 | 4.80 | 2.60 | 2.90 | 6.20 | 5.90 | 5.00 | 7.00 | 4.00 J | 4.00 J | 3.00 | 4.47 | 5.30 | 5.00 | 2.50 |
| LF16 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS |
| LF19 | BR | | 2.00 | 2.00 | 1.50 | 1.00 U | 0.86 J | 7.20 | 10.00 | 3.00 | 13.00 | 9.00 | 12.00 J | 10.00 J | 8.00 | 9.90 | 13.00 | 9.80 | 11.00 |
| LF20 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| LF21 | GT | | 2.70 | 3.60 | 4.30 | 4.40 | 3.40 | 3.30 | 3.30 | 3.10 | 3.00 J | 3.00 J | 2.00 J | 2.00 J | 2.00 J | 2.50 | 3.50 | 3.00 | 2.40 |
| LF22 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF23 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF24 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF25 | BR | | 0.17 J | 0.14 J | 0.71 J | 0.15 J | 1.00 U | 1.00 U | 1.30 | 1.00 U | 5.00 U | 0.80 J | 0.40 J | 0.50 J | 0.10 J | 0.30 J | 0.31 J | 0.22 J | 0.20 J |
| LF26 | GT | | 1.40 | 0.84 J | 1.20 | 0.96 J | 1.50 | 0.91 J | 0.99 J | 1.20 | 1.00 J | 0.40 J | 2.00 J | 0.80 J | 1.00 | 1.00 U | 0.43 J | 0.27 J | 0.74 J |
| LF27 | BR | | 1.60 J | 0.87 J | 2.20 | 1.10 | 0.99 J | 1.10 | 2.20 | 1.90 | 1.00 J | 3.00 | 0.90 J | 1.00 J | 0.70 J | 1.45 | 2.00 | 1.60 | 1.00 |
| LF28 | GT | | 0.45 J | 0.55 J | 0.72 J | 0.52 J | 0.64 J | 0.61 J | 0.80 J | 0.96 J | 5.00 U | 0.60 J | 0.60 J | 0.80 J | 0.40 J | 0.50 J | 0.76 J | 0.74 J | 0.56 J |
| LF29 | BR | | 0.84 J | 0.67 J | 1.20 | 0.79 J | 0.79 J | 0.65 J | 0.99 J | 1.00 U | 5.00 U | 1.00 | 0.60 J | 0.60 J | 0.30 J | 0.50 J | 0.80 J | 0.69 J | 0.20 J |

Notes:
µg/L - micrograms per liter.
MCL - Safe Drinking Water Act Maximum Contaminant Level.
Meets or exceeds the MCL.
NS - Not sampled.
U - Less than the detection limit provided.
J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

TABLE 5-9
HISTORICAL LFWSP GROUNDWATER SAMPLING RESULTS FOR TCE
TOBYHANNA ARMY DEPOT

| | | Analyte: | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | TCE | |
|---------|---------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|--------|
| | | MCL: | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| WELL ID | Aquifer | Date: | Apr-01 | Oct-01 | Apr-02 | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Apr-05 | Oct-05 | Apr-06 | Oct-06 | Apr-07 | Dec-08 | Nov-09 | Nov-10 | Nov-11 |
| LF10 | BR | | 0.46 J | 0.30 J | 0.48 J | 0.28 J | 0.53 J | 2.80 | 7.30 | 8.50 | 11.00 | 11.00 | 15.00 J | 13.00 J | 6.00 | 14.30 | 15.00 | 11.00 | 18.00 |
| LF11 | BR | | 2.20 | 1.90 | 2.60 | 1.40 | 1.70 | 1.20 | 5.60 | 6.30 | 10.00 | 10.00 | 12.00 J | 14.00 J | 10.00 | 16.50 | 22.00 | 19.00 | 18.00 |
| LF12 | BR | | 1.80 | 2.30 | 1.80 | 3.00 | 1.80 | 2.20 | 5.30 | 4.90 | 5.00 J | 7.00 J | 4.00 J | 6.00 J | 4.00 | 8.64 | 10.00 | 11.00 | 5.80 |
| LF16 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS |
| LF19 | BR | | 1.30 | 1.30 | 0.92 J | 1.00 U | 0.48 J | 7.60 | 16.00 | 3.20 | 29.00 | 18.00 | 32.00 J | 28.00 J | 18.00 | 23.30 | 27.00 | 19.00 | 27.00 |
| LF20 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| LF21 | GT | | 1.20 | 1.80 | 2.10 | 1.90 | 1.70 | 1.40 | 1.80 | 2.20 | 4.00 J | 4.00 J | 4.00 J | 5.00 J | 4.00 J | 5.29 | 6.60 | 6.10 | 5.80 |
| LF22 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF23 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF24 | GT | | 1.00 U | 0.19 J | 1.00 U | 0.12 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 5.00 U | 0.20 J | 0.2 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 0.16 J | 1.00 U |
| LF25 | BR | | 0.69 J | 0.48 J | 0.87 J | 0.35 J | 0.48 J | 0.40 J | 1.40 | 1.00 U | 5.00 U | 0.90 J | 0.4 J | 0.80 J | 0.20 J | 0.70 J | 0.53 J | 0.40 J | 1.00 U |
| LF26 | GT | | 1.30 | 0.92 J | 1.40 | 1.00 | 1.60 | 1.30 | 1.70 | 1.70 | 2.00 J | 1.00 | 2.00 J | 2.00 J | 1.00 | 1.24 | 1.70 | 1.70 | 2.20 |
| LF27 | BR | | 1.40 | 0.80 J | 1.80 | 0.96 J | 0.95 J | 1.20 | 2.20 | 1.70 | 2.00 J | 3.00 | 1.00 J | 2.00 J | 0.90 J | 2.52 | 3.70 | 3.60 | 2.10 |
| LF28 | GT | | 0.64 J | 0.75 J | 0.96 J | 0.72 J | 0.83 J | 0.78 J | 0.97 J | 1.00 U | 5.00 U | 0.70 U | 0.7 J | 0.80 J | 0.50 J | 0.80 J | 1.20 | 1.20 | 1.00 |
| LF29 | BR | | 1.30 | 1.40 | 2.30 | 1.60 | 2.30 | 2.10 | 2.60 | 2.00 | 1.00 J | 2.00 | 2.00 J | 1.00 J | 0.70 J | 1.13 | 1.70 | 1.70 | 0.50 J |

Notes:
µg/L - micrograms per liter.
MCL - Safe Drinking Water Act Maximum Contaminant Level.
Meets or exceeds the MCL.
NS - Not sampled.
U - Less than the detection limit provided.
J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

TABLE 5-10
HISTORICAL LFWSP GROUNDWATER SAMPLING RESULTS FOR VINYL CHLORIDE
TOBYHANNA ARMY DEPOT

| | | Analyte: | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | Vinyl Chloride | | |
|---------|---------|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------|--------|
| | | MCL: | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | |
| WELL ID | Aquifer | Date: | Apr-01 | Oct-01 | Apr-02 | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Apr-05 | Oct-05 | Apr-06 | Oct-06 | Apr-07 | Dec-08 | Nov-09 | Nov-10 | Nov-11 | |
| LF10 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | |
| LF11 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF12 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF16 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS |
| LF19 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF20 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| LF21 | GT | | 1.00 U | 1.00 | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 UJ | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF22 | GT | | 0.43 J | 0.46 J | 0.40 J | 0.44 J | 0.42 J | 0.30 J | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 0.40 J | 1.00 U | 0.40 J | 1.00 U | 0.35 J | 0.64 J | 0.42 J |
| LF23 | GT | | 1.80 | 1.40 | 1.10 | 1.10 | 1.90 | 1.60 | 7.90 | 21.00 | 10.00 J | 3.00 | 2.00 J | 2.00 J | 2.00 | 0.69 J | 1.20 | 1.60 | 1.50 | |
| LF24 | GT | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF25 | BR | | 21.00 | 24.00 | 10.00 | 18.00 | 19.00 | 16.00 | 2.40 | 5.00 | 10.00 U | 3.00 | 3.00 J | 4.00 J | 1.00 | 4.00 | 5.60 | 9.70 | 2.10 | |
| LF26 | GT | | 1.40 | 0.22 J | 1.30 | 0.33 J | 1.30 | 0.76 J | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 0.60 J | 0.60 J | 0.40 J | 1.00 U | 0.29 J | 0.40 J | 0.33 J |
| LF27 | BR | | 0.95 J | 1.00 U | 0.76 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF28 | GT | | 0.16 J | 0.21 J | 0.36 J | 0.26 J | 0.35 J | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |
| LF29 | BR | | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 10.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U | 1.00 U |

Notes:
µg/L - micrograms per liter.
MCL - Safe Drinking Water Act Maximum Contaminant Level.
Meets or exceeds the MCL.
NS - Not sampled.
U - Less than the detection limit provided.
J - Indicates sample results between the method detection limit (MDL) and Contract Required Detection Limit (CRDL).

TABLE 5-11
HISTORICAL LFWSP GROUNDWATER SAMPLING RESULTS FOR DISSOLVED ARSENIC
TOBYHANNA ARMY DEPOT

| | | Analyte: | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | Dissolved Arsenic | | | | | | | | | | | | | | | |
|---------|---------|----------|-------------------|-----|-------------------|--------|-------------------|--------|-------------------|------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|----|--------|----|
| | | MCL: | 10 | | 10 | | 10 | | 10 | | 10 | | 10 | | 10 | | 10 | | 10 | | 10 | | | | | | | | | | | | | | | |
| WELL ID | Aquifer | Date: | Oct-01 | | Apr-01 | | Apr-02 | | Oct-02 | | Apr-03 | | Oct-03 | | Apr-04 | | Oct-04 | | Apr-05 | | Oct-05 | | Apr-06 | | Oct-06 | | Apr-07 | | Dec-08 | | Nov-09 | | Nov-10 | | Nov-11 | |
| LF12 | BR | | | | | | | | | | | | | NS | | NS | | NS | | NS | | 5.00 U | | NS | | NS | | NS | | NS | | NS | | NS | | NS |
| LF13 | GT | | 10.6 | | 8.09 | | 20 | | 15 | | 20 | | 15 | | 14 | | 7.3 | | 28.8 | | 15.6 J | | 17.1 J | | 23.90 | | 19.20 J | | 24.00 | | 22.00 | | 21.30 | | 36.00 | |
| LF16 | BR | | 0.913 B | 3 U | 1.4 J | 0.78 B | 1.4 J | 0.78 B | 10 U | 10 U | 5 U | 5.00 U | 5 U | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | |
| LF20 | GT | | 1 B | 3 U | 1.5 J | 0.36 B | 1.5 J | 0.36 B | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | NS | | |
| LF22 | GT | | 37.5 | | 27.2 | | 39 | | 35 | | 39 | | 35 | | 28 | | 8.64 J | | 29.2 | | 33.6 | | 26.8 K | | 32.90 | | 33.70 | | 36.40 | | 37.70 | | 35.10 | | 42.00 | |
| LF23 | GT | | 110 | | 109 | | 100 | | 110 | | 100 | | 110 | | 74 | | 55 | | 67.3 | | 105 | | 92.9 | | 87.20 | | 84.30 | | 118.00 | | 105.00 | | 118.00 | | 86.00 | |
| LF24 | GT | | 0.801 B | 3 U | 1.1 J | 0.37 B | 1.1 J | 0.37 B | 10 U | 10 U | 5 U | 5.00 U | 5 U | 5.00 U | 5 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | | | |
| LF26 | GT | | 1.2 B | 3 U | 3 U | 3 U | 1.1 B | 3 U | 1.1 B | 10 U | 10 U | 5 U | 5.00 U | 5 U | 5.00 U | 5 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | | | |
| LF27 | BR | | 1.16 B | 3 U | 3 U | 3 U | 0.59 B | 3 U | 0.59 B | 10 U | 10 U | 5 U | 5.00 U | 5 U | 5.00 U | 5 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | | | |
| LF28 | GT | | 1.03 B | 3 U | 3 U | 3 U | 3 U | 3 U | 3 U | 10 U | 10 U | 5 U | 5.00 U | 5 U | 5.00 U | 5 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | | | |
| LF29 | BR | | 1.05 B | 3 U | 3 U | 3 U | 3 U | 3 U | 3 U | 10 U | 10 U | 5 U | 5.00 U | 5 U | 5.00 U | 5 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 15.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | 10.00 U | | | |

Notes:
All concentrations are in micrograms per
MCL - Safe Drinking Water Act Maximum
GT - Glacial Till
BR - Bedrock
NS - Not Sampled.
Meets or exceeds the MCL.
U - Less than the detection limit provided.
J - Indicates sample results between the
B - For inorganics, the value is between the MDL and PQL.
K - Biased High

Table 5-12
Mann Kendall Analysis Results
OU-5 Groundwater

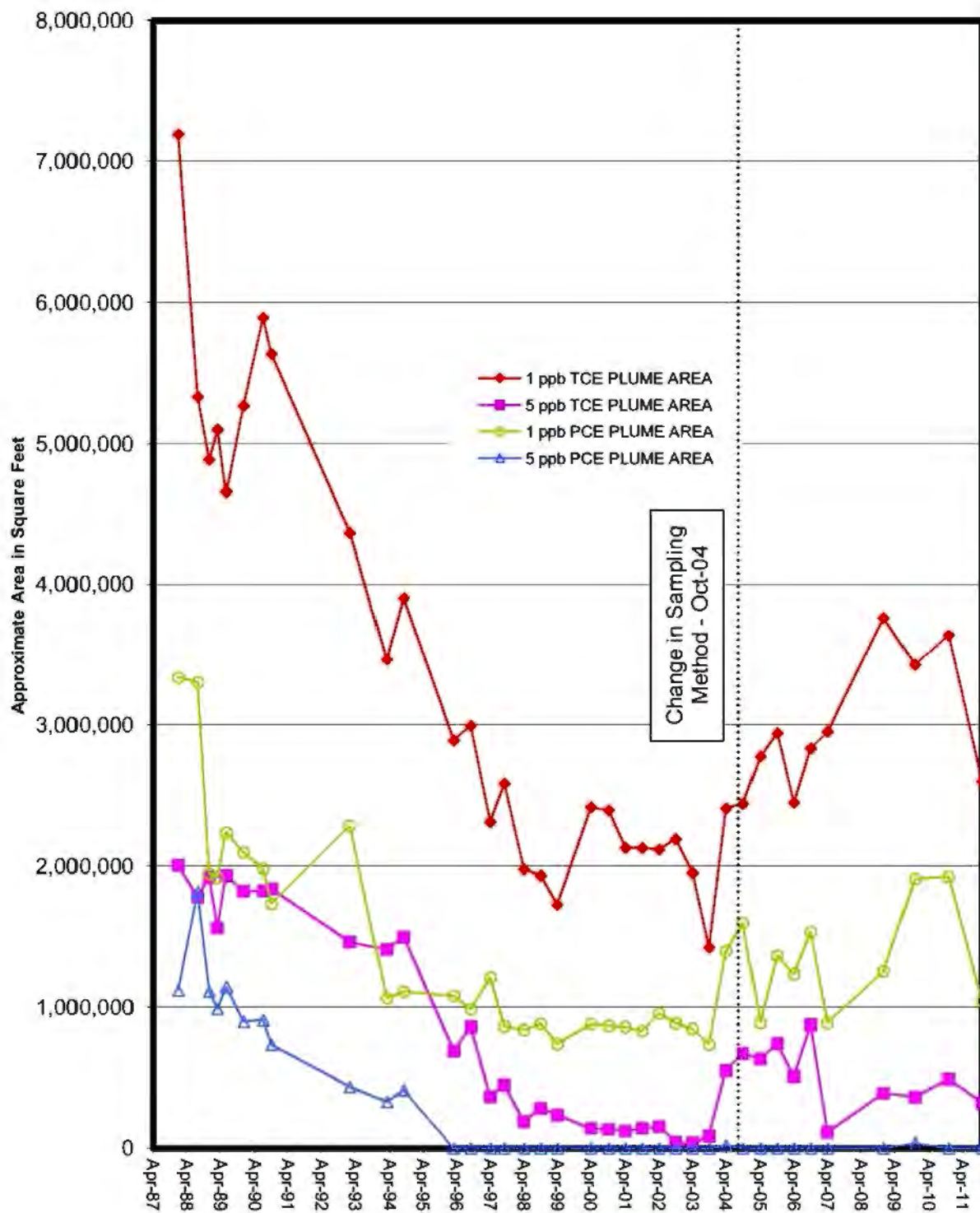
| Chemical and Well ID | Geologic Unit | Number of Events | Minimum (µg/L) | Median (µg/L) | Maximum (µg/L) | Mann Kendall Statistic (S) | Standardized Test Statistic (Z) | Confidence Factor (1-p) % | Trend (95% level of significance) |
|---------------------------|---------------|------------------|----------------|---------------|----------------|----------------------------|---------------------------------|---------------------------|-----------------------------------|
| Benzene | | | | | | | | | |
| LF22 | GT | 17 | 0.38 | 2 | 7 | 29 | 1.157 | 86.5% | No Trend |
| PCE | | | | | | | | | |
| LF10 | BR | 17 | 0.42 | 6 | 7.6 | 83 | 3.394 | 100.0% | Increasing |
| LF19 | BR | 17 | 0.86 | 9 | 13 | 65 | 2.643 | 99.6% | Increasing |
| LF21 | GT | 17 | 2 | 3 | 4.4 | -61 | -2.489 | 99.3% | Decreasing |
| LF27 | BR | 17 | 0.7 | 1.1 | 3 | -4 | -0.124 | 54.8% | No Trend |
| TCE | | | | | | | | | |
| LF11 | BR | 17 | 1.2 | 10 | 22 | 99 | 4.049 | 100.0% | Increasing |
| LF12 | BR | 17 | 1.8 | 4.9 | 11 | 88 | 3.598 | 100.0% | Increasing |
| LF19 | BR | 17 | 0.48 | 18 | 32 | 73 | 2.973 | 99.9% | Increasing |
| LF21 | GT | 17 | 1.2 | 4 | 6.6 | 101 | 4.153 | 100.0% | Increasing |
| LF26 | GT | 17 | 0.92 | 1.6 | 2.2 | 51 | 2.09 | 97.9% | Increasing |
| LF27 | BR | 17 | 0.8 | 1.8 | 3.7 | 59 | 2.391 | 99.1% | Increasing |
| Vinyl Chloride | | | | | | | | | |
| LF23 | GT | 17 | 0.69 | 1.8 | 21 | -3 | -0.0828 | 51.6% | No Trend |
| LF25 | BR | 17 | 1 | 5.6 | 24 | -67 | -2.726 | 99.7% | Decreasing |
| Arsenic (Filtered) | | | | | | | | | |
| LF13 | GT | 17 | 7.3 | 19.2 | 36 | 66 | 2.682 | 99.7% | Increasing |
| LF22 | GT | 17 | 8.64 | 35 | 42 | 18 | 0.701 | 75.5% | No Trend |
| LF23 | GT | 17 | 55 | 100 | 118 | -12 | -0.456 | 67.2% | No Trend |

Notes:

GT - Glacial Till

BR - Bedrock

**FIGURE 5-1
TYAD MWSP
TCE AND PCE GROUNDWATER PLUME AREAS**



6. FIVE-YEAR REVIEW PROCESS

During the review process, an objective was to determine whether the remedy at OU's 1, 4, and 5 at the TYAD site are protective of human health and the environment. To accomplish this goal, all available documents and data were reviewed. Information about the TYAD site and groundwater sampling data was obtained from the following documents:

- *Record of Decision, Operable Unit 1 (Areas A and B) (USAEC, 1997).*
- *Record of Decision, Operable Unit 4 (USAEC, 2000).*
- *Record of Decision, Operable Unit 5 (USAEC, 2000).*
- *Master Plan, Tobyhanna Army Depot, Section 4 Environmental Quality, Long Range Component, July 2009 (TYAD, 2009)*
- *Letter to Coolbaugh Township Zoning Office requesting TYAD be notified of any new construction in Coolbaugh Township (TYAD, 1996)*
- *Final Remedial Design for Operable Unit 1 (Areas A and B), Tobyhanna Army Depot (WESTON, June 1998).*
- *Final Remedial Design for Operable Unit 5, Tobyhanna Army Depot (WESTON, February 2001).*
- *Historical Records Review, Tobyhanna Army Depot (Malcolm Pirnie, Inc., 2004).*
- *MEC Removal Action at Proposed Training and Conference Center Site, Tobyhanna Army Depot (WESTON, 2004).*
- *Groundwater Monitoring Reports, Tobyhanna Army Depot, Monitor/Residential Well Sampling Program (WESTON, 1998-2006).*
- *Groundwater Monitoring Reports, Tobyhanna Army Depot, Landfill Well Sampling Program (WESTON, 2000-2006).*
- *Five-year Review Report for Operable Unit 1 (Areas A and B), Operable Unit 4 and Operable Unit 5 (WESTON, 2002).*
- *Building Foundation Study Old Sanitary Landfill (WESTON, 2006).*
- *Five-year Review Report for Operable Unit 1 (Areas A and B), Operable Unit 4 and Operable Unit 5 (WESTON, 2007).*

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- *Annual Performance Evaluations, Tobyhanna Army Depot, Monitor/Residential Well Sampling Program, Operable Unit 1 (Areas A and B)* (WESTON, 2007, 2009-2011).
- *Annual Performance Evaluations, Tobyhanna Army Depot, Monitor/Residential Well Sampling Program, Operable Unit 1 (Areas A and B)* (ERT, 2008).
- *Annual Performance Evaluations, Tobyhanna Army Depot, Powder Smoke Ridge UXO Area, Operable Unit 4* (WESTON, 2007, 2009-2011).
- *Annual Performance Evaluations, Tobyhanna Army Depot, Powder Smoke Ridge UXO Area, Operable Unit 4* (ERT, 2008).
- *Annual Performance Evaluations, Tobyhanna Army Depot, Landfill Well Sampling Program, Operable Unit 5* (WESTON, 2007, 2009-2011).
- *Annual Performance Evaluations, Tobyhanna Army Depot, Landfill Well Sampling Program, Operable Unit 5* (ERT, 2008).
- *Final Remedial Investigation Report, Investigation and Removal of Munitions and Explosives of Concern, Munitions Response Site (MRS) TYAD-02-R-01 (Firing Point No. 6), Tobyhanna Army Depot* (WESTON, 2011).
- *Draft Vapor Intrusion Pathway Study Report Tobyhanna Operable Unit 1* (WESTON, 2012).

EPA conducted a site inspection of TYAD on 22 April 2012 as part of the Five-Year Review process. A brief description of the site inspection is provided below.

Representatives of the Army, EPA Region 3, and PADEP met at TYAD on 22 April 2012 to conduct a site inspection of OU-1, OU-4, and OU-5. Prior to the site visits, a meeting was held in the TYAD EMD office to discuss the status of the three OUs plus any new information that had become available since the last Five-Year Review. The primary topics covered were the vapor intrusion sampling activities conducted in OU-1, the UXO removal actions conducted in OU-4 and the surrounding State Park and State Game Lands, the new buildings (with vapor barriers and passive ventilation systems) being constructed at OU-1 Area A, and the adequacy of the five strand barbed-wire perimeter fence along the northern boundary of OU-4. The possibility of future UXO Removal Actions within OU-4 was also discussed.

Following the meeting, site visits were conducted at OU-1, OU-4, and OU-5 to observe the existing conditions. The site inspection included observation of the condition of the monitoring well network, the OU-4 perimeter fence and gates, the new buildings being constructed in OU-1

Area A, the former OU-1 Area B contaminant source area, and the OU-5 landfill cap on Cell B that had been pierced by antenna equipment and later repaired. A site inspection checklist and photographs of the site visit provided by EPA and TYAD are presented in **Appendix E**.

The Army did not complete formal interviews with the community as part of this Five-Year Review for the following reasons: 1) the Army has kept the community involved on a regular basis throughout the CERCLA process through newspaper notices and visits to individual resident's homes; and 2) feedback from the community involvement, including throughout the past two Five-Year Review processes, indicates that the community is satisfied with the progress of the CERCLA cleanup at TYAD and does not have major concerns. However, a summary of recent interview issues discussed with residents has been included in **Appendix F**. Proof of publication for the Five-Year Review Public Notice is also provided in **Appendix F**.

7. TECHNICAL ASSESSMENT

The results of the technical assessment, in accordance with EPA guidance, are included in Tables 7-1 through 7-3 below. Recommendations regarding all OUs are included in Section 9.

Table 7-1 Operable Unit 1 Technical Assessment

| Questions and Assessment Criteria | Comments |
|---|---|
| Question A: Is the Remedy functioning as intended by the Decision Documents? Yes | |
| Compliance with HASP | Sampling activities have been conducted in accordance with approved HASP. |
| Implementation in accordance with ROD | Long-term monitoring has been implemented through semi-annual groundwater sampling at on-post and off-post monitoring wells, and off-post residential wells, from 1998 to 2011. Samples have been analyzed for the TCL VOCs using EPA Method 8260A, and total and dissolved lead using EPA Method 7421. The COCs for this project are cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), vinyl chloride, PCE, and TCE. |
| System performance/O&M | System performance/O&M is documented in the Annual Performance Evaluations referenced in Section 6. Evaluation of the groundwater data, as well as historical data, indicate that the concentration and size of the TCE and PCE groundwater plumes continue to follow an overall decreasing trend (see Figure 5-1). Based on an analysis of the existing groundwater data since the September 1994 sampling event, the plume sizes are decreasing at an approximate average rate of 170,030 ft ² /year or 3.90 acres/year for the 1 µg/L TCE plume, 62,372 ft ² /year or 1.43 acres/year for the 5 µg/L TCE plume, and 84,974 ft ² /year or 1.95 acres/year for the 1 µg/L PCE plume. Therefore, the remedy is performing as expected. However, there are currently no criteria in place for demonstrating that COCs have permanently decreased to concentrations less than the performance standards for the remedial action at OU-1. |

Table 7-1 Operable Unit 1 Technical Assessment (Continued)

| Questions and Assessment Criteria | Comments |
|---|---|
| Opportunities for optimization | Several opportunities to optimize groundwater monitoring activities at OU-1 have been identified in the <i>Draft 2011 Annual Performance Evaluation Report for OU 1, OU 4 and OU 5</i> (WESTON, 2011) and are described in Section 5.1. The changes will not impact the protectiveness of the remedy. |
| Early indicators of potential issues | There are no early indicators of potential issues based on the review of groundwater monitoring data. Contaminant concentrations continue to follow an overall decreasing trend and the contaminant plume continues to decrease in size and extent. EPA's preliminary assessment for the vapor intrusion pathway is that "Based on preliminary results of the vapor intrusion investigation, and based on our site inspection of March 22, 2012, there does not appear to be any indicators of potential remedy issues that would interfere with the protectiveness of any of the remedies for the three OUs subject to this review." |
| Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? Yes | |
| Changes in standards and To Be Considered criteria (TBCs) | There have been no changes to the performance standards (MCLs). |
| Changes in exposure pathways | There have been no significant changes in site setting (i.e., land use or physical site conditions) and no new exposure pathways have been identified for human health or ecological receptors. Groundwater monitoring data does not indicate changes in site risk from contaminant migration. The vapor intrusion pathway was investigated in 2011 and preliminary results indicate that vapor intrusion is not a pathway of concern for OU-1. An additional sample will be collected at one residence to confirm the preliminary results and conclusions. |

Table 7-1 Operable Unit 1 Technical Assessment (Continued)

| Questions and Assessment Criteria | Comments |
|---|--|
| Newly identified contaminants or contaminant sources | No additional contaminants identified during monitoring. As part of the vapor intrusion investigation, groundwater from MW-23 was analyzed for 1,4-dioxane, which is used as a stabilizer for TCE by chemical companies and it is sometimes detected at TCE sites and had not been tested for previously at OU-1. MW-23 was analyzed for 1,4-dioxane (Method 8270C) in 2009 because it contains the highest concentrations of VOCs and would be expected to contain 1,4-dioxane if it is present in the plume. 1,4-Dioxane was not detected in MW-23 at the Reporting Limit of 1.9 µg/L (0.56µg/L Method Detection Limit). |
| Unanticipated toxic byproducts of the remedy | Byproducts of MNA of VOCs (e.g., vinyl chloride) are being monitored as part of the sampling program for OU-1. |
| Changes in toxicity and other contaminant characteristics | The recent changes in TCE and PCE toxicity criteria will be reviewed as part of the proposed re-evaluation of the MNA remedy for OU-1 to be presented in the next Five-Year Review. |
| Changes in risk assessment methods | There have been no changes in risk assessment methods that affect the protectiveness of the remedy. |
| Expected progress toward meeting RAOs | Groundwater model predictions presented in the OU-1 ROD predicted that attainment of ARARs would not be achieved in 70 years if the soil contaminant source was left in place. However, the Area B soil removal was conducted to remove as much of the contaminant source area as possible and the ROD predicted meeting ARARs in a shorter, but unspecified timeframe. The costs for the MNA remedial alternative presented in the ROD were based on a 15 year timeframe, which ends in 2012. Based on the results of the trends analyses for the COCs (see Appendix A), RAOs will not be achieved within the 15 year time frame. The time it will take to meet the RAOs will be reviewed during the re-evaluation of the MNA remedy at OU-1. |
| Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No | |
| 4-Ecological risk assessment | There have been no changes in ecological risk assessment methods or additional information that affect the protectiveness of the remedy. There are no ecological risks associated with groundwater. |

Table 7-1 Operable Unit 1 Technical Assessment (Continued)

| Questions and Assessment Criteria | Comments |
|--|--|
| Natural disaster impacts | No natural disasters have affected site conditions at OU-1 since the ROD was signed. |
| Other information that could call into question the protectiveness of the remedy | No additional information has been collected that would call into question the protectiveness of the remedy. |

Table 7-2 Operable Unit 4 Technical Assessment

| Questions and Assessment Criteria | Comments |
|---|--|
| Question A: Is the Remedy functioning as intended by the Decision Documents? Yes | |
| Compliance with HASP | Site activities have been conducted in accordance with approved HASP and Explosives Safety Submissions. |
| Implementation in accordance with ROD | Institutional controls have been implemented in accordance with ROD with the following components: 1) Physical Controls; 2) Security Patrols/Monitoring; 3) UXO Support; 4) Proprietary Controls; 5) Public/Employee Education; and 6) Periodic (Five-Year) Review. Proprietary controls only take effect if/when the property is transferred. |
| System performance/O&M | The in-place O&M procedures, which are documented in the Annual Performance Evaluations referenced in Section 6 and include inspection/repair of physical controls, security patrols/monitoring, review of deed restrictions, UXO support, and public/employee education, should maintain the effectiveness of the institutional controls. |
| Opportunities for optimization | The institutional controls in place are adequate. The UXO removals conducted during the last 5 years have reduced the UXO risk in OU-4. |
| Early indicators of potential issues | There are no early indicators of potential issues that would affect the protectiveness of the remedy for OU-4. |
| Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? Yes | |
| Changes in standards and To Be Considered criteria (TBCs) | There have been no changes to the performance standards. |
| Changes in exposure pathways | There have been no significant changes in site setting (i.e., land use or physical site conditions) and no new exposure pathways have been identified for human health or ecological receptors. |
| Newly identified contaminants or contaminant sources | No new sources of MEC or MC have been identified. |
| Unanticipated toxic byproducts of the remedy | None identified. |

Table 7-2 Operable Unit 4 Technical Assessment (Continued)

| Questions and Assessment Criteria | Comments |
|---|--|
| Changes in toxicity and other contaminant characteristics | There have been no changes in toxicity or other chemical characteristics that affect the protectiveness of the remedy. |
| Changes in risk assessment methods | There have been no changes in risk assessment methods that affect the protectiveness of the remedy, although a MEC Hazard Assessment was conducted as part of this current review. |
| Expected progress toward meeting RAOs | RAOs for Operable Unit 4 have been achieved based on the implementation of ICs. |
| Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No | |
| Ecological risk assessment | There have been no changes in ecological risk assessment methods or additional information that affect the protectiveness of the remedy. |
| Natural disaster impacts | No natural disasters have affected site conditions at OU-4 since the ROD was signed. |
| Other information that could call into question the protectiveness of the remedy | No additional information has been collected that would call into question the protectiveness of the remedy. |

Table 7-3 Operable Unit 5 Technical Assessment

| Questions and Assessment Criteria | Comments |
|---|--|
| Question A: Is the Remedy functioning as intended by the Decision Documents? Yes | |
| Compliance with HASP | Sampling activities have been conducted in accordance with approved HASP. |
| Implementation in accordance with ROD | Long-term monitoring has been implemented through semi-annual/annual groundwater sampling from 2000 to 2011. Groundwater samples collected were analyzed for TCL VOCs, TCL SVOCs, total cyanide, and total and dissolved metals. The TCL VOCs were analyzed in accordance with EPA Method 8260 B. The TCL SVOCs were analyzed in accordance with EPA Method 8270C. The total cyanide samples were analyzed in accordance with EPA Method 9012. The metal analyses were performed in accordance with EPA Method 6010B, 6020, and 7470A. |
| System performance/O&M | System performance/O&M is documented in the Annual Performance Evaluations referenced in Section 6. Evaluation of the groundwater data, as well as historical data, indicate that the concentration and size of the benzene, vinyl chloride, 1,2 DCP, and PCE groundwater plumes continue to follow an overall decreasing trend. An increasing TCE trend was identified that TYAD plans to investigate during the next year. However, the remedy is performing as expected. |
| Opportunities for optimization | Several opportunities to optimize groundwater monitoring activities at OU-5 have been identified in the <i>Draft 2011 Annual Performance Evaluation Report for OU 1, OU 4 and OU 5</i> (WESTON, 2011) and are described in Section 5.3. The changes will not impact the protectiveness of the remedy. |
| Early indicators of potential issues | During testing of an antenna at OU-5, holes were installed through the cover material to anchor/stabilize the antenna. The Army was notified of the activity and the holes were ultimately repaired. Review of groundwater monitoring data has identified an increasing trend in the TCE groundwater concentrations that requires additional investigation. |

Table 7-3 Operable Unit 5 Technical Assessment (Continued)

| Questions and Assessment Criteria | Comments |
|---|--|
| Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? Yes | |
| Changes in standards and To Be Considered criteria (TBCs) | There have been no changes to the performance standards (MCLs). |
| Changes in exposure pathways | There have been no significant changes in site setting (i.e., land use or physical site conditions) and no new exposure pathways have been identified for human health or ecological receptors. Groundwater monitoring data does not indicate changes in site risk from contaminant migration. |
| Newly identified contaminants or contaminant sources | No additional contaminants/hazards identified during monitoring. |
| Unanticipated toxic byproducts of the remedy | The remedy selected and implemented is not expected to affect the chemical characteristics of the site. |
| Changes in toxicity and other contaminant characteristics | The recent changes in TCE and PCE toxicity criteria will be reviewed as part of the proposed re-evaluation of the MNA remedy for OU-5 to be presented in the next Five-Year Review. |
| Changes in risk assessment methods | There have been no changes in risk assessment methods that affect the protectiveness of the remedy. |
| Expected progress toward meeting RAOs | The costs for the MNA remedial alternative presented in the OU-5 ROD were based on a 30-year timeframe, which ends in 2030. Based on the current concentrations of COCs and the upward trends observed for the COCs (see Appendix D), progress toward meeting RAOs and the required timeframe will be reviewed during the proposed re-evaluation of the MNA remedy for OU-5. |
| Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No | |
| Ecological risk assessment | There have been no changes in ecological risk assessment methods or additional information that affect the protectiveness of the remedy. There are no ecological risks associated with groundwater. |

Table 7-3 Operable Unit 5 Technical Assessment (Continued)

| Questions and Assessment Criteria | Comments |
|--|--|
| Natural disaster impacts | No natural disasters have affected site conditions at OU-5 since the ROD was signed. |
| Other information that could call into question the protectiveness of the remedy | No additional information has been collected that would call into question the protectiveness of the remedy. |

8. ISSUES

The issues identified during the Five-Year Review are noted in **Table 8-1** below. The Army does not consider these issues to be sufficient to warrant a finding that the remedy is not protective as long as corrective actions are implemented in a timely manner with respect to each issue.

Table 8-1 Issues Identified During the Five-Year Review

| Issues Identified during 2012 Five-Year Review | Currently Affects Protectiveness (Y/N) | Affects Future Protectiveness (Y/N) |
|--|--|-------------------------------------|
| 1. OU-1: Rights of entry for property R1-94 | | |
| TYAD needs to re-establish rights of entry for property R1-94 with the new owners. This is a critical sampling property required to develop complete and accurate contaminant plume maps | N | Y |
| 2. OU-1: Vapor intrusion study | | |
| The vapor sampling and draft report have recently been completed and the <i>Draft Vapor Intrusion Pathway Study Report for Tobyhanna Operable Unit 1</i> (WESTON, 2012) is currently under review by PADEP and EPA. Any issues identified by EPA and PADEP will need to be resolved. | N | Y |
| 3. OU-1: Residential vapor sample at property R1-111 | | |
| During the second round of vapor sampling there was a detection of TCE on the first floor of one of the residences. This first floor location should be re-sampled to confirm the detection and verify that the detected levels of TCE were the result of a household source. | N | Y |
| 4. OU-1: Exit strategy for groundwater monitoring | | |
| A clear, well-defined exit strategy for groundwater monitoring at OU-1 has not been developed. There are no criteria for demonstrating that the COCs have permanently decreased to concentrations less than the performance standards for the remedial actions. The MNA remedy for OU-1 should be re-evaluated before the next Five-Year Review as part of the Annual Performance Evaluations. | N | Y |

Table 8-1 Issues Identified During the Five-Year Review (Continued)

| | | |
|---|---|---|
| 5. OU-1: Re-evaluate MNA remedy | | |
| It has been 15 years since the MNA remedy was selected and the RAOs have not been achieved.. The MNA remedy for OU-1 should be re-evaluated before the next Five-Year Review as part of the Annual Performance Evaluations. | N | Y |
| 6. OU-5: TCE groundwater concentrations – increasing trend | | |
| In 2004 there was a spike of TCE in the groundwater in several bedrock wells at OU-5 (potentially due to new sampling methods begun in 2004 or high groundwater levels in 2004). However, the concentrations of TCE found in the off post groundwater monitoring wells that are downgradient of OU-5 are well below the MCL. So the contamination from this site is still contained within TYAD. This increasing trend should be reviewed as part of the planned re-evaluation of the MNA remedy for OU-5 before the next Five-Year Review. | N | Y |
| 7. OU-5: Re-evaluate MNA remedy | | |
| Based on the upward trends observed for the COCs at OU-5, the MNA remedy for OU-5 should be re-evaluated before the next Five-Year Review as part of the Annual Performance Evaluations. | N | Y |

9. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Recommendations and required follow-up actions for OU-1 and OU-5 based on the issues identified in Section 8 are summarized in Table 9-1 below.

Table 9-1 Recommendations and Follow-Up Actions

| Issue No. and OU | Recommendations/ Follow-up Actions | Responsible Party | Oversight Agency | Milestone Date | Affects Protectiveness (Y/N) | |
|------------------|---|-------------------|------------------|---|------------------------------|--------|
| | | | | | Current | Future |
| 1. OU-1 | Re-establish rights of entry for property R1-94 with the new owners. | Army | EPA | Fall 2012 | N | Y |
| 2. OU-1 | Finalize the <i>Vapor Intrusion Pathway Study Report for Tobyhanna Operable Unit 1</i> (WESTON, 2012). | Army | EPA | 3 rd or 4 th Quarter 2012 | N | Y |
| 3. OU-1 | Resample the first floor of one residential location due to an elevated TCE reading in one of the indoor air samples. | Army | EPA | 3 rd or 4 th Quarter 2012 | N | Y |
| 4. OU-1 | Develop Exit Strategy as part of the upcoming Annual Performance Evaluations of the remedy for OU-1. | Army | EPA | 1 st Quarter 2014 | N | Y |
| 5. OU-1 | Re-evaluate the MNA remedy for OU-1 in conjunction with the upcoming Annual Performance Evaluations | Army | EPA | September 2017 | N | Y |

Table 9-1 Recommendations and Follow-Up Actions (Continued)

| Issue No. and OU | Recommendations/ Follow-up Actions | Responsible Party | Oversight Agency | Milestone Date | Affects Protectiveness (Y/N) | |
|---------------------|--|----------------------|---------------------|------------------------------|------------------------------------|--------|
| | | | | | Current | Future |
| 6. OU-5 | Investigate OU-5 to determine what is causing the levels of TCE to increase as part of the upcoming Annual Performance Evaluations of the remedy for OU-5. | Army | EPA | 1 st Quarter 2014 | N | Y |
| 7. OU-5 | Re-evaluate the MNA remedy for OU-5 in conjunction with the upcoming Annual Performance Evaluations | Army | EPA | September 2017 | N | Y |

10. PROTECTIVE STATEMENT(S)

10.1 OPERABLE UNIT 1

The remedy at OU-1 (Natural Attenuation/Long-Term Monitoring/Institutional controls) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled.

10.2 OPERABLE UNIT 4

The remedy at OU-4 (Institutional controls) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled.

10.3 OPERABLE UNIT 5

The remedy at OU-5 (Natural Attenuation/Long-Term Monitoring/Institutional controls) is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled.

11. NEXT REVIEW

The next five year review will be due on 27 September 2017, which is five years after the due date of the current review. This is in compliance with Army and EPA policy. The Five-Year Review will be conducted in 2017 for the following OUs:

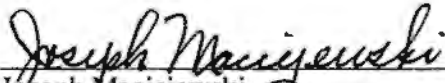
- OU-1 – Monitor/Residential Well Sampling Program
- OU-4 – Powder Smoke Ridge UXO Area
- OU-5 – Landfill Well Sampling Program.

12. SIGNATURES

Tobyhanna Army Depot Five-Year Review Report approval signatures:



Nathan W. Edwards
Chief Environmental Management Division
Tobyhanna Army Depot



Joseph Maciejewski
Director of Industrial Risk Management
Tobyhanna Army Depot

APPENDICES

| | |
|-------------------|--|
| APPENDIX A | OU-1 GROUNDWATER |
| APPENDIX B | OU-1 VAPOR INTRUSION STUDY RESULTS SUMMARY |
| APPENDIX C | OU-1 AND OU-4 – MEC AND NEW CONSTRUCTION INFORMATION |
| APPENDIX D | OU-5 GROUNDWATER |
| APPENDIX E | FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST AND PHOTOS |
| APPENDIX F | PUBLIC INVOLVEMENT |
| APPENDIX G | MEC HAZARD ASSESSMENT |

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APPENDIX A

OU-1 GROUNDWATER

FINAL

OU-1 CONTAMINANT CONTOUR MAPS



Legend:

- Contaminant Plume
(in parts per billion)
- TYAD Property Line
- Approximate Location of Bedrock Monitoring Well
- Approximate Location of Glacial Till Monitoring Well
- MW-1 On-Post Monitoring Well
- ON-1 On-Post Water Supply Well
- R1-109 Off-Post Residential Well
- NS Not Sampled
- ND Compound Not Detected



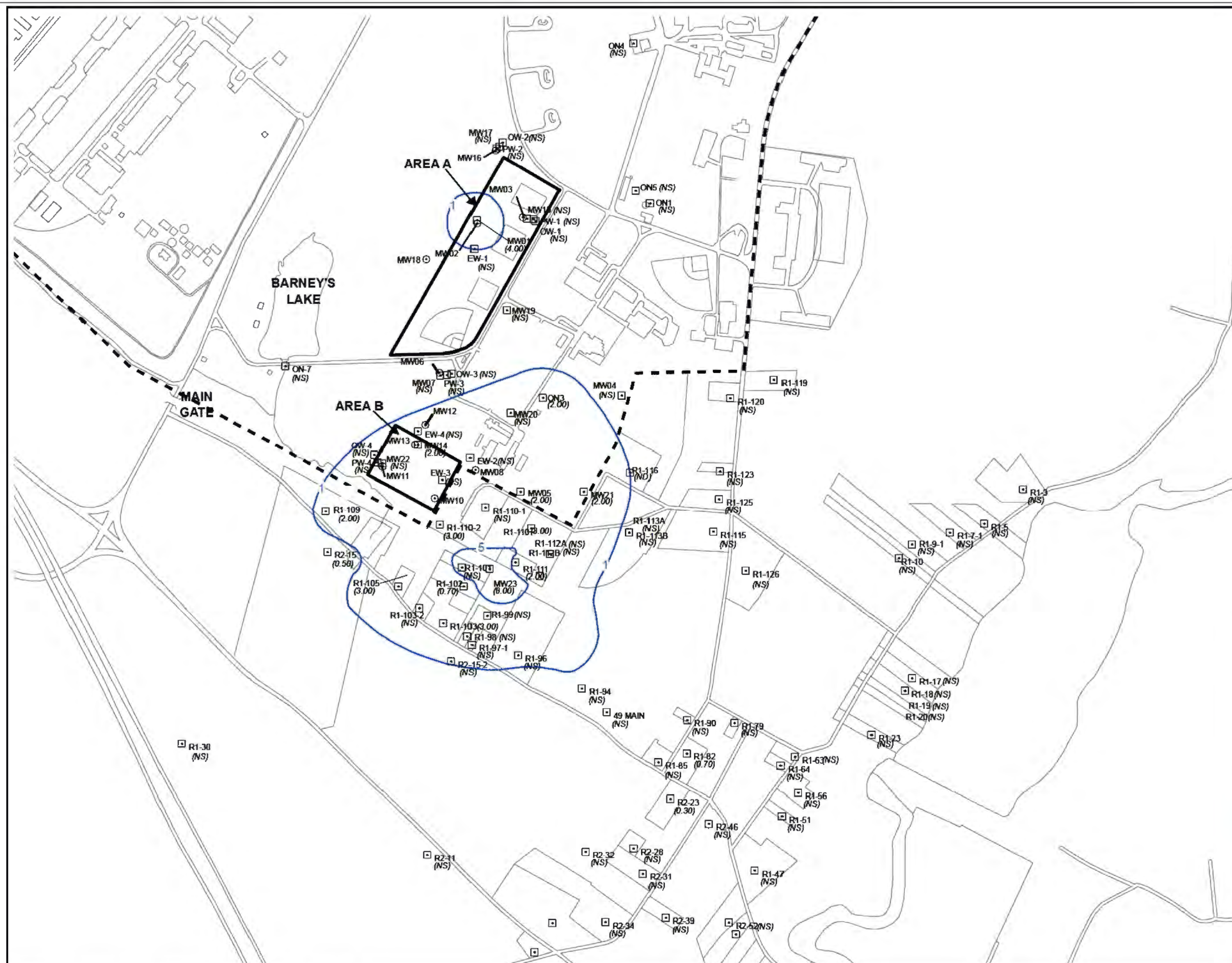
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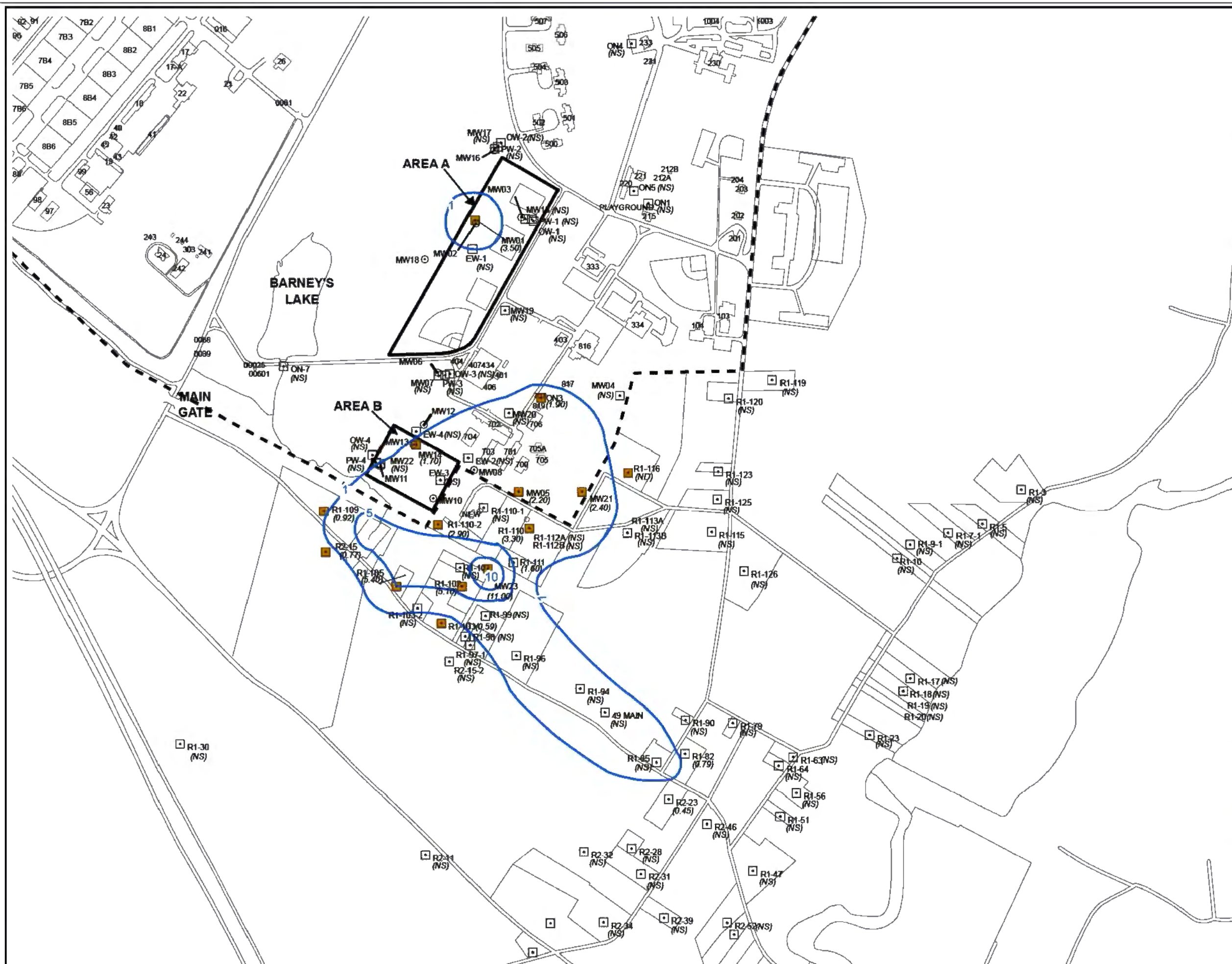
TOBYHANNA
Army Depot Environmental
Excellence



U.S. Army Corps of Engineers
Baltimore District

Appendix A-1
TCE Concentration Contour
Bedrock Aquifer
Areas A and B
30 April - 16 May 2007





Legend:

- 1 — Contaminant Plume
(in parts per billion)
- TYAD Property Line
- Approximate Location of Bedrock Monitoring Well
- Approximate Location of Bedrock Monitoring Well (Results)
- Approximate Location of Glacial Till Monitoring Well
- MW-1 On-Post Monitoring Well
- ON-1 On-Post Water Supply Well
- R1-109 Off-Post Residential Well
- NS Not Sampled
- ND Compound Not Detected



0 300 600 1,200 Feet

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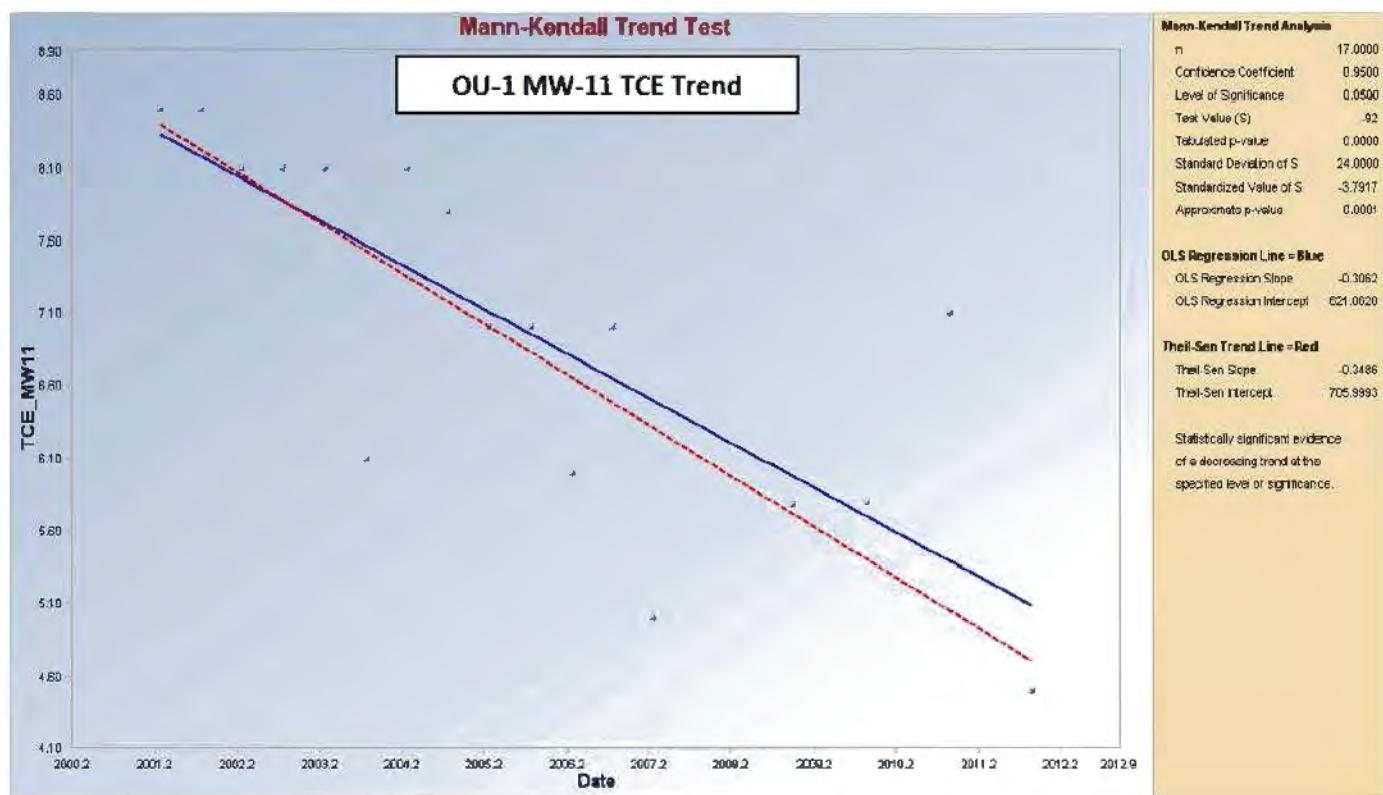
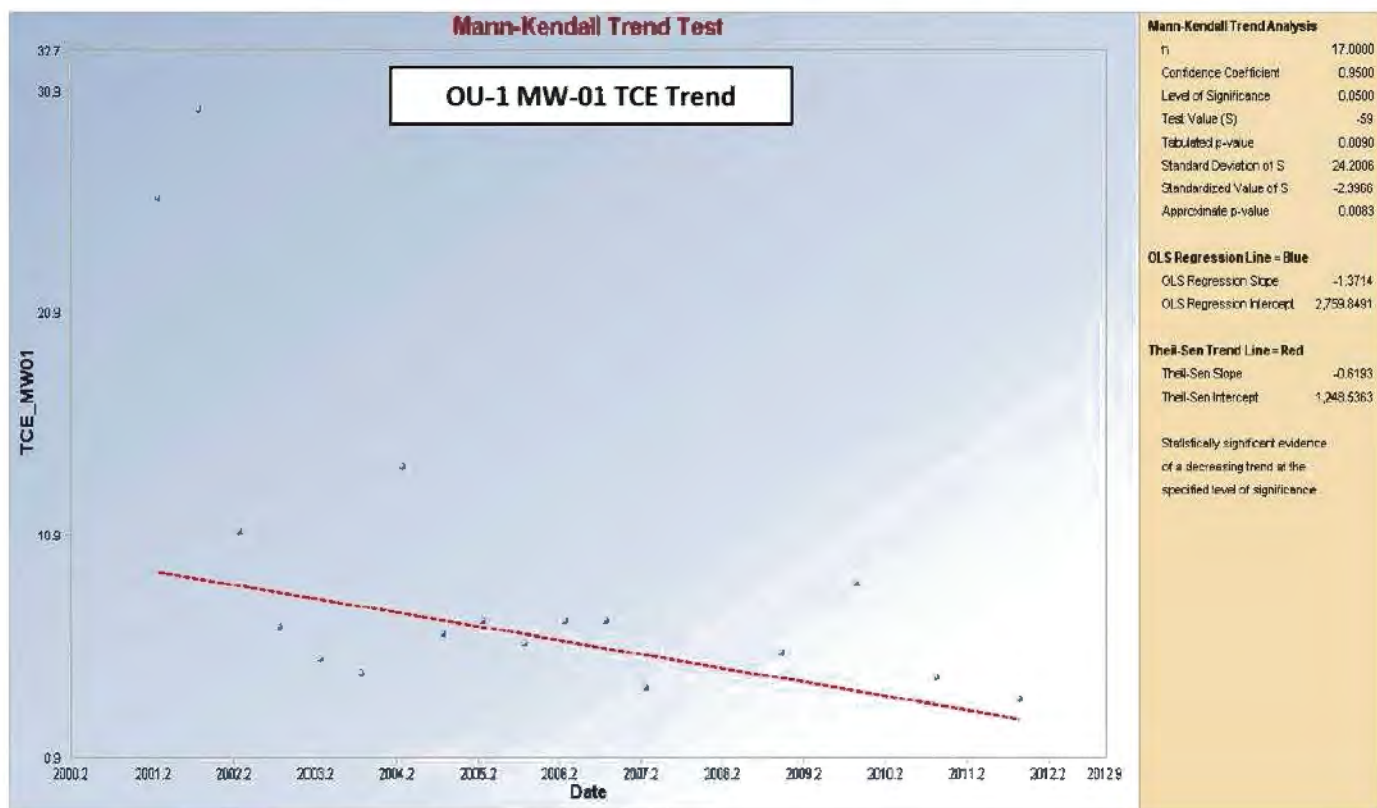
U.S. Army Corps of Engineers
Baltimore District

Appendix A-2
TCE Concentration Contour
Bedrock Aquifer
Areas A and B
November 2011

FINAL

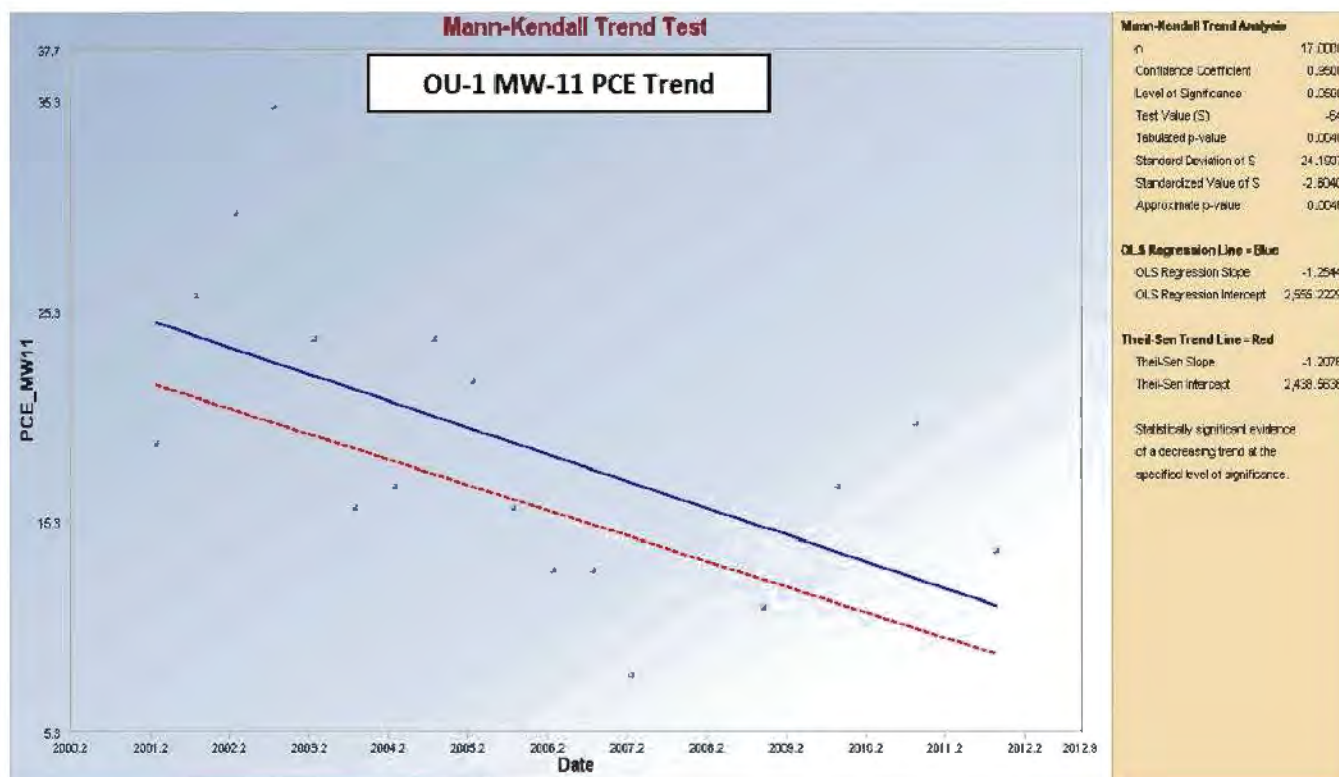
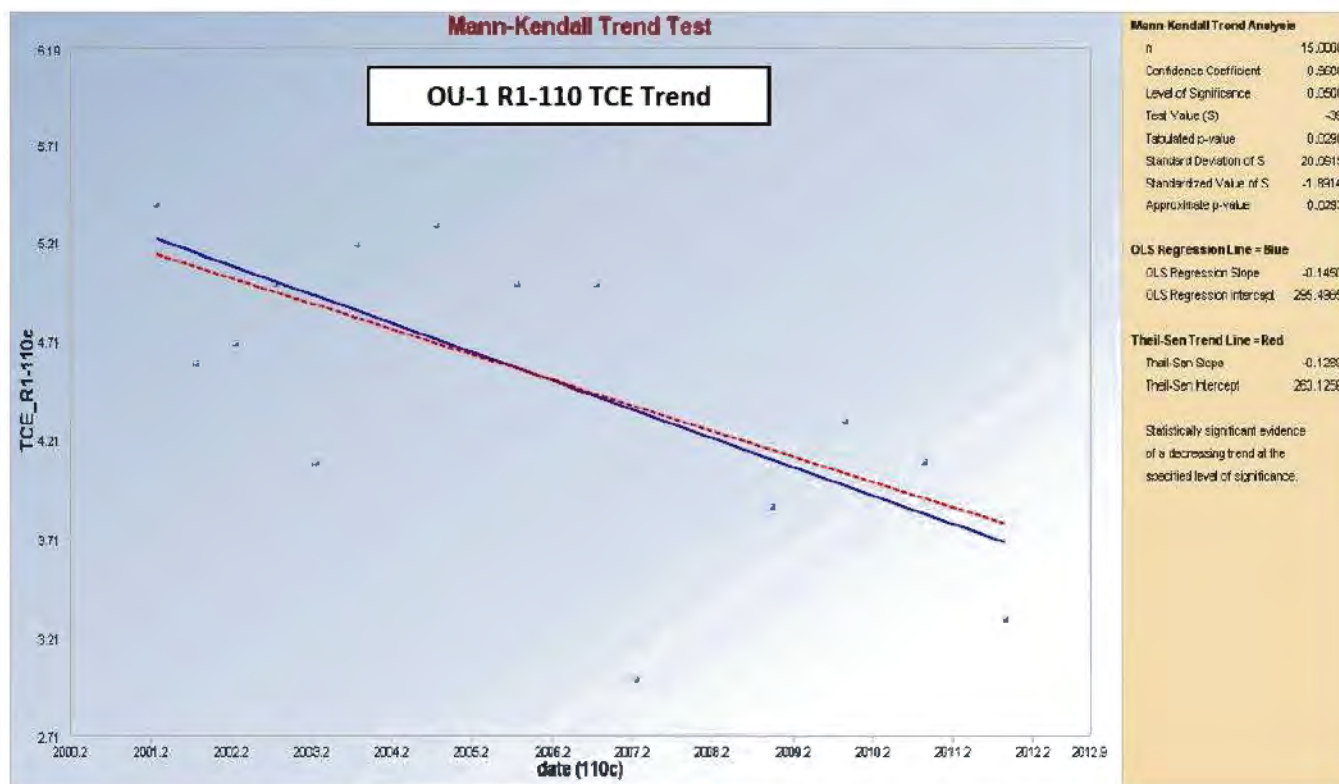
OU-1 MANN-KENDALL RESULTS

Appendix A-5 TYAD Operable Unit 1 – Mann Kendall Trend Graphs

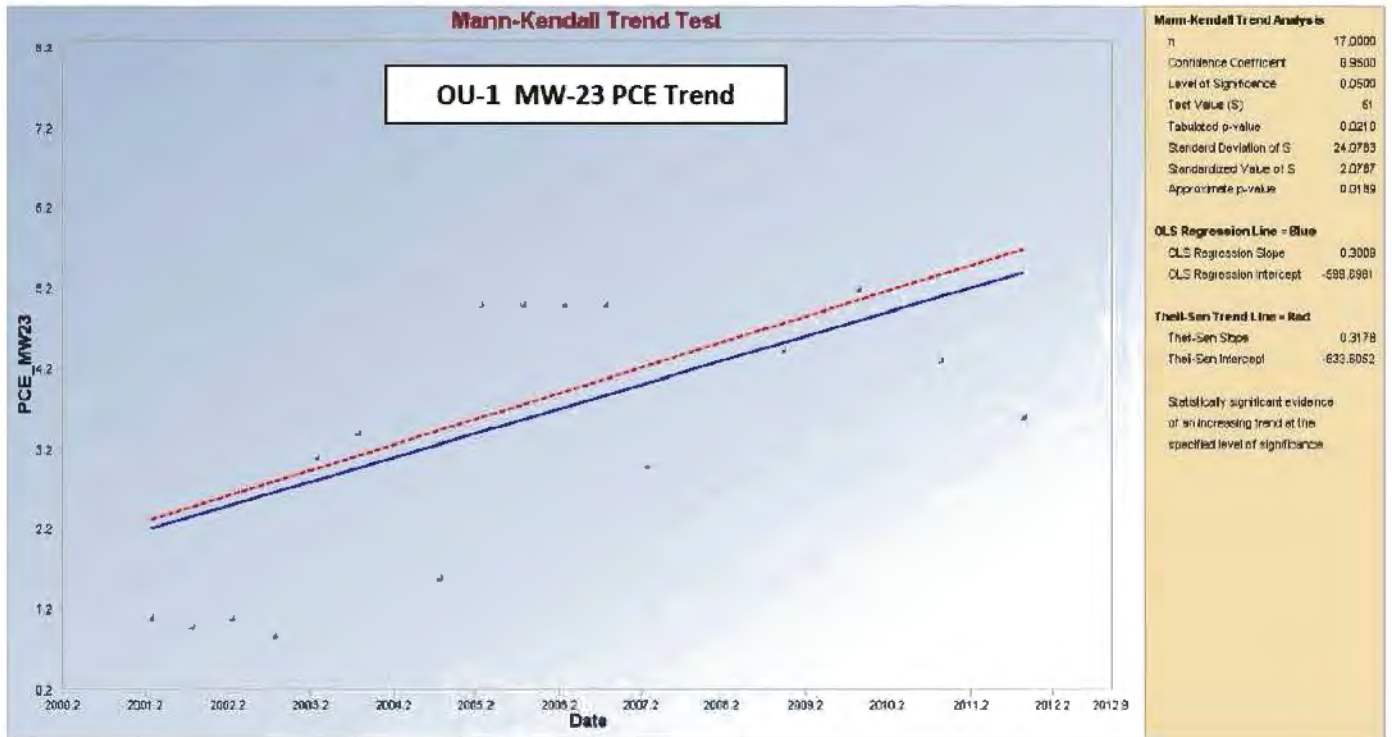


Appendix A-5

TYAD Operable Unit 1 – Mann Kendall Trend Graphs



Appendix A-5 TYAD Operable Unit 1 – Mann Kendall Trend Graphs



FINAL

**OU-1 MWSP MONITORING WELL CONTAMINANT STATUS
1998 – 2011**

ATTACHMENT A-6
MWSP TCE PLUME AREA AS A FUNCTION OF TIME
TOBYHANNA ARMY DEPOT

| 1 ppb TCE CONTOUR | | | 5 ppb TCE CONTOUR | | |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| DATE | PLUME AREA (FT ²) | PERCENT OF ORIGINAL PLUME AREA | DATE | PLUME AREA (FT ²) | PERCENT OF ORIGINAL PLUME AREA |
| Jan-88 | 7,191,000 | 100% | Jan-88 | 2,006,300 | 100% |
| Aug-88 | 5,330,985 | 74% | Aug-88 | 1,782,360 | 89% |
| Dec-88 | 4,885,800 | 68% | Dec-88 | 1,922,380 | 96% |
| Mar-89 | 5,096,600 | 71% | Mar-89 | 1,561,790 | 78% |
| Jun-89 | 4,657,180 | 65% | Jun-89 | 1,932,360 | 96% |
| Dec-89 | 5,266,200 | 73% | Dec-89 | 1,823,400 | 91% |
| Jul-90 | 5,892,800 | 82% | Jul-90 | 1,826,300 | 91% |
| Oct-90 | 5,633,200 | 78% | Oct-90 | 1,842,300 | 92% |
| Feb-93 | 4,364,900 | 61% | Feb-93 | 1,460,700 | 73% |
| Mar-94 | 3,465,218 | 48% | Mar-94 | 1,408,444 | 70% |
| Sep-94 | 3,903,950 | 54% | Sep-94 | 1,496,230 | 75% |
| Mar-96 | 2,890,000 | 40% | Mar-96 | 691,500 | 34% |
| Sep-96 | 2,995,000 | 42% | Sep-96 | 860,000 | 43% |
| Apr-97 | 2,315,000 | 32% | Apr-97 | 367,500 | 18% |
| Sep-97 | 2,585,900 | 36% | Sep-97 | 449,500 | 22% |
| Apr-98 | 1,978,000 | 28% | Apr-98 | 189,500 | 9% |
| Oct-98 | 1,934,500 | 27% | Oct-98 | 284,000 | 14% |
| Apr-99 | 1,725,700 | 24% | Apr-99 | 236,000 | 12% |
| Apr-00 | 2,416,900 | 34% | Apr-00 | 139,000 | 7% |
| Oct-00 | 2,394,900 | 33% | Oct-00 | 133,600 | 7% |
| Apr-01 | 2,131,600 | 30% | Apr-01 | 120,900 | 6% |
| Oct-01 | 2,129,900 | 30% | Oct-01 | 142,000 | 7% |
| Apr-02 | 2,120,404 | 29% | Apr-02 | 150,660 | 8% |
| Oct-02 | 2,192,944 | 30% | Oct-02 | 39,060 | 2% |
| Apr-03 | 1,953,003 | 27% | Apr-03 | 33,480 | 2% |
| Oct-03 | 1,422,902 | 20% | Oct-03 | 89,280 | 4% |
| Apr-04 | 2,410,564 | 34% | Apr-04 | 552,421 | 28% |
| Oct-04 | 2,441,231 | 34% | Oct-04 | 672,103 | 33% |
| Apr-05 | 2,777,174 | 39% | Apr-05 | 632,594 | 32% |
| Oct-05 | 2,942,587 | 41% | Oct-05 | 741,285 | 37% |
| Apr-06 | 2,449,456 | 34% | Apr-06 | 508,407 | 25% |
| Oct-06 | 2,835,849 | 39% | Oct-07 | 875,649 | 44% |
| Apr-07 | 2,952,932 | 41% | Apr-07 | 113,256 | 6% |
| Dec-08 | 3,764,516 | 52% | Dec-08 | 390,905 | 19% |
| Nov-09 | 3,428,968 | 48% | Nov-09 | 362,940 | 18% |
| Nov-10 | 3,640,765 | 51% | Nov-10 | 491,600 | 25% |
| Nov-11 | 2,600,188 | 36% | Nov-11 | 322,258 | 16% |

| DATE | PLUME AREA (ft ²) 5 PPB TCE | Plume & Rock Volume (ft ³) Thickness=100 ft | Plume & Rock Volume (gallons) | Plume Volume at Effective Porosity (5%) | Plume Volume at Effective Porosity (10%) | Plume Volume at Effective Porosity (15%) |
|------------|---|---|-------------------------------|---|--|--|
| Jan-88 | 2,006,300 | 200,630,000 | 1,500,913,030 | 75,045,652 | 150,091,303 | 225,136,955 |
| Nov-11 | 322,258 | 32,225,800 | 241,081,210 | 12,054,060 | 24,108,121 | 36,162,181 |
| Difference | 1,684,042 | 168,404,200 | 1,259,831,820 | 62,991,591 | 125,983,182 | 188,974,773 |

----- Dotted line represents the change in sampling methodology in October 2004.

ATTACHMENT A-7
MWSP PCE PLUME AREA AS A FUNCTION OF TIME
TOBYHANNA ARMY DEPOT

| 1 ppb PCE CONTOUR | | | 5 ppb PCE CONTOUR | | |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| DATE | PLUME AREA (FT ²) | PERCENT OF ORIGINAL PLUME AREA | DATE | PLUME AREA (FT ²) | PERCENT OF ORIGINAL PLUME AREA |
| Jan-88 | 3,337,800 | 100% | Jan-88 | 1,119,750 | 100% |
| Aug-88 | 3,304,820 | 99% | Aug-88 | 1,817,800 | 162% |
| Dec-88 | 1,950,200 | 58% | Dec-88 | 1,111,700 | 99% |
| Mar-89 | 1,920,400 | 58% | Mar-89 | 986,100 | 88% |
| Jun-89 | 2,237,900 | 67% | Jun-89 | 1,141,680 | 102% |
| Dec-89 | 2,098,500 | 63% | Dec-89 | 896,800 | 80% |
| Jul-90 | 1,984,000 | 59% | Jul-90 | 909,250 | 81% |
| Oct-90 | 1,733,400 | 52% | Oct-90 | 735,000 | 66% |
| Feb-93 | 2,289,000 | 69% | Feb-93 | 436,100 | 39% |
| Mar-94 | 1,062,300 | 32% | Mar-94 | 329,600 | 29% |
| Sep-94 | 1,110,890 | 33% | Sep-94 | 413,300 | 37% |
| Mar-96 | 1,080,000 | 32% | Mar-96 | 0 | 0% |
| Sep-96 | 985,000 | 30% | Sep-96 | 0 | 0% |
| Apr-97 | 1,212,500 | 36% | Apr-97 | 0 | 0% |
| Sep-97 | 864,130 | 26% | Sep-97 | 0 | 0% |
| Apr-98 | 840,200 | 25% | Apr-98 | 0 | 0% |
| Oct-98 | 884,213 | 26% | Oct-98 | 0 | 0% |
| Apr-99 | 739,500 | 22% | Apr-99 | 0 | 0% |
| Apr-00 | 880,790 | 26% | Apr-00 | 0 | 0% |
| Oct-00 | 867,370 | 26% | Oct-00 | 0 | 0% |
| Apr-01 | 859,320 | 26% | Apr-01 | 0 | 0% |
| Oct-01 | 831,550 | 25% | Oct-01 | 0 | 0% |
| Apr-02 | 954,181 | 29% | Apr-02 | 0 | 0% |
| Oct-02 | 887,221 | 27% | Oct-02 | 0 | 0% |
| Apr-03 | 848,162 | 25% | Apr-03 | 0 | 0% |
| Oct-03 | 736,561 | 22% | Oct-03 | 0 | 0% |
| Apr-04 | 1,396,832 | 42% | Apr-04 | 22,320 | 2% |
| Oct-04 | 1,596,388 | 48% | Oct-04 | 0 | 0% |
| Apr-05 | 891,277 | 27% | Apr-05 | 0 | 0% |
| Oct-05 | 1,364,252 | 41% | Oct-05 | 0 | 0% |
| Apr-06 | 1,235,931 | 37% | Apr-06 | 0 | 0% |
| Oct-06 | 1,531,904 | 46% | Oct-06 | 0 | 0% |
| Apr-07 | 888,624 | 27% | Apr-07 | 0 | 0% |
| Dec-08 | 1,254,359 | 38% | Dec-08 | 0 | 0% |
| Nov-09 | 1,910,815 | 57% | Nov-09 | 37,957 | 3% |
| Nov-10 | 1,925,856 | 58% | Nov-10 | 0 | 0% |
| Nov-11 | 1,043,494 | 31% | Nov-11 | 0 | 0% |

----- Dotted line represents the change in sampling methodology in October 2004.

ATTACHMENT A-8
MWSP MONITORING WELL CONTAMINANT STATUS
TOBYHANNA ARMY DEPOT

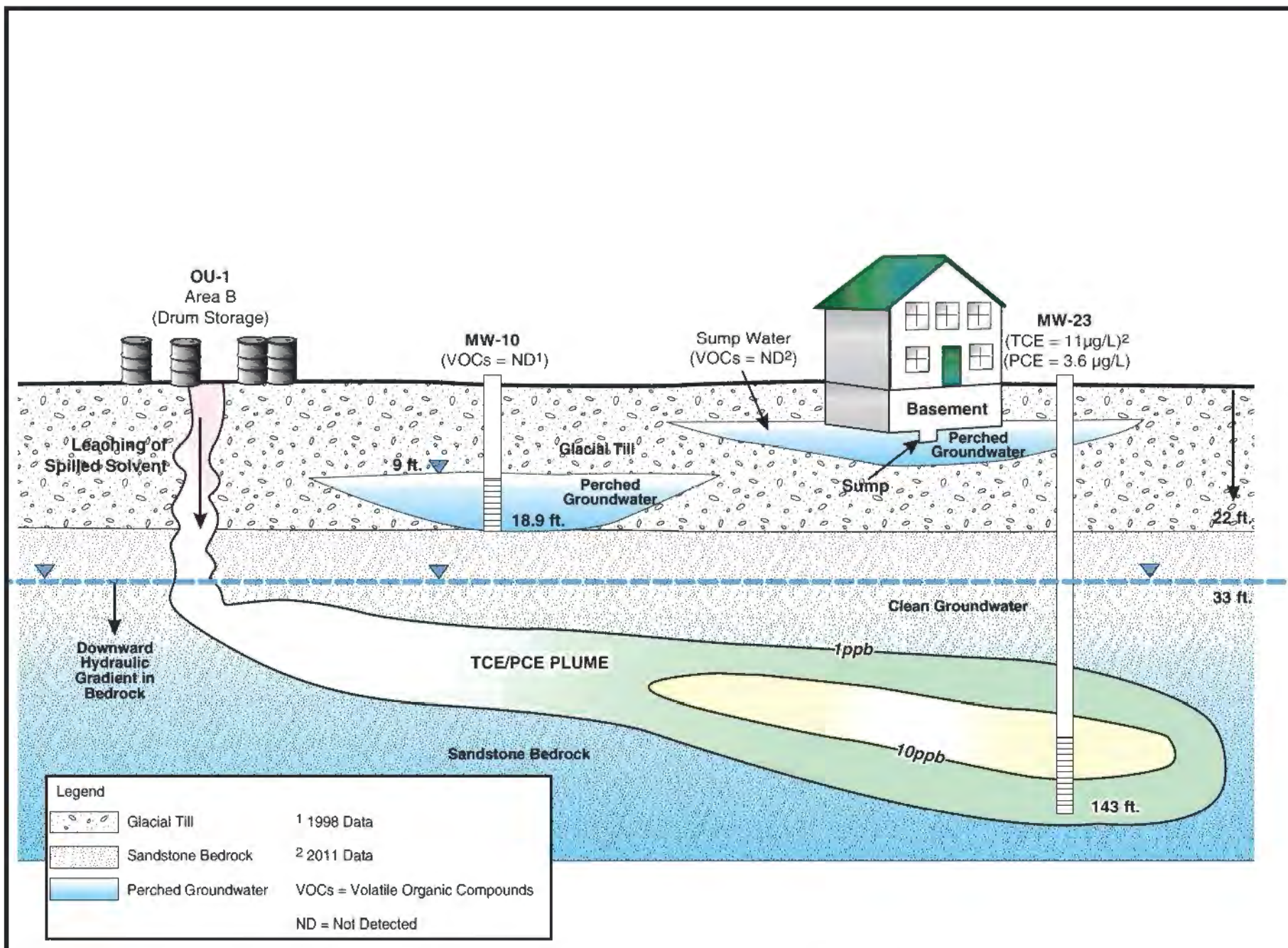
| WELL ID | Aquifer | Sep-96 | Apr-97 | Sep-97 | Apr-98 | Oct-98 | Apr-99 | Oct-99 | Apr-00 | Oct-00 | Apr-01 | Oct-01 | Apr-02 | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Apr-05 | Oct-05 | Apr-06 | Oct-06 | Apr-07 | Dec-08 | Nov-09 | Nov-10 | Nov-11 |
|------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| MW01 | BR | Hits | Hits | Hits | Hits | Hits | Hits | NS | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | BMCL | Hits | Hits | Hits | Hits | |
| MW02 | GT | | | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW03 | GT | | | BMCL | | NS | | NS | | BMCL | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW04 | BR | | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW05 | BR | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | BMCL | BMCL | Hits | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | |
| MW06 | GT | | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW07 | BR | | | | | | | NS | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW08 | GT | | | | | | | NS | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW10 | GT | | | | | | | NS | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW11 | GT | Hits | Hits | Hits | Hits | Hits | Hits | NS | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | |
| MW12 | GT | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | NS | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | |
| MW13 | GT | BMCL | BMCL | Hits | BMCL | Hits | BMCL | NS | BMCL | BMCL | BMCL | Hits | Hits | Hits | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | BMCL | Hits | BMCL | Hits | Hits | BMCL | |
| MW14 | BR | BMCL | BMCL | BMCL | BMCL | Hits | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | BMCL | BMCL | BMCL | Hits | BMCL | BMCL | |
| MW15 | BR | | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW16 | BR | | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW17 | BR | | | | | | | NS | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW18 | BR | | | | BMCL | | BMCL | NS | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW19 | BR | | | BMCL | | | | NS | | BMCL | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW20 | BR | | | | | NS | NS | NS | NS | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW21 | BR | Hits | Hits | Hits | Hits | Hits | Hits | NS | BMCL | BMCL | BMCL | BMCL | Hits | BMCL | BMCL | BMCL | Hits | BMCL | BMCL | BMCL | Hits | Hits | BMCL | BMCL | Hits | Hits | |
| MW22 | BR | | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | |
| MW23 | BR | Hits | BMCL | Hits | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | Hits | Hits | BMCL | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | |
| R1-79 | BR | | | BMCL | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-82 | BR | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | NS | BMCL | NS | BMCL | BMCL | BMCL | BMCL | |
| R1-90 | BR | | | BMCL | BMCL | NS | BMCL | NS | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-94 | BR | | | BMCL | | NS | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | | BMCL | NS | Hits | BMCL | Hits | BMCL | BMCL | NS | |
| R1-96 | BR | | | | | | | NS | | | NS | NS | NS | NS | NS | NS | NS | | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-97-1 | BR | | | BMCL | BMCL | | BMCL | NS | | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-98 | BR | | | | | | | NS | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-99 | BR | | | | | | | NS | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-101 | BR | BMCL | | BMCL | BMCL | | BMCL | NS | | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-102 | BR | | | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | BMCL | NS | Hits | NS | Hits | BMCL | Hits | Hits | Hits | |
| R1-103 | BR | Hits | Hits | Hits | Hits | Hits | BMCL | NS | Hits | BMCL | BMCL | Hits | BMCL | Hits | BMCL | Hits | Hits | BMCL | NS | Hits | NS | Hits | BMCL | BMCL | Hits | BMCL | |
| R1-103-2 | BR | | | | BMCL | BMCL | | NS | BMCL | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-105 | BR | NS | NS | NS | NS | NS | Hits | NS | Hits | Hits | Hits | Hits | Hits | Hits | Hits | BMCL | NS | BMCL | NS | Hits | NS | Hits | BMCL | NS | BMCL | Hits | |
| R1-109 | BR | NS | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | Hits | NS | BMCL | NS | BMCL | NS | BMCL | BMCL | BMCL | BMCL | |
| R1-110 | BR | Hits | Hits | Hits | Hits | Hits | Hits | NS | Hits | Hits | Hits | BMCL | Hits | Hits | BMCL | Hits | Hits | Hits | NS | Hits | NS | Hits | BMCL | BMCL | BMCL | BMCL | |
| R1-110-1 | BR | | | BMCL | | NS | | NS | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-110-2 | BR | Hits | NS | NS | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | | NS | NS | NS | Hits | BMCL | BMCL | BMCL | BMCL | |
| R1-111 | BR | BMCL | BMCL | BMCL | NS | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | |
| R1-112B | BR | | | | | BMCL | BMCL | NS | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-113A | BR | | | | | | NS | NS | NS | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-115 | BR | | | BMCL | | NS | | NS | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R1-116 | BR | BMCL | BMCL | BMCL | BMCL | | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | | | BMCL | BMCL | BMCL | BMCL | BMCL | | | | | |
| R2-15 | BR | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | |
| R2-15-2 | BR | | | NS | NS | NS | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R2-23 | BR | | | BMCL | BMCL | BMCL | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | NS | BMCL | BMCL | BMCL | BMCL | |
| R2-28 | BR | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R2-31 | BR | | | | | | | NS | BMCL | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| R2-46 | BR | | | NS | BMCL | NS | BMCL | NS | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| ON1 | BR | | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| ON2 | BR | | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| ON3 | BR | BMCL | BMCL | Hits | BMCL | BMCL | NS | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | |
| ON4 | BR | | | NS | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| ON5 | BR | | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| ON6 | BR | | | | | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |
| MAINCHURCH | BR | BMCL | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | |

Notes:
COPCs - Chemicals of potential concern include: cis- and trans-1,2-DCE; vinyl chloride; PCE; and TCE.
BR - Bedrock aquifer.
GT - Glacial till (overburden) aquifer.
Hits - One or more of the COPCs were detected at levels above the associated MCL(s).
- None of the COPCs were detected at any level in the associated sample.
BMCL - One or more of the COPCs were detected, but not at levels above the associated MCL.
NS - Well not sampled during specified round.

FINAL

APPENDIX B

OU-1 VAPOR INTRUSION STUDY RESULTS SUMMARY



Appendix B-2
Sump Water Lab Results
Tobyhanna Army Depot
Tobyhanna, PA

| BASEMENT WATER SAMPLES Vapor Intrusion Contaminants of Concern | PA Act 2 Residential MSC Groundwater Standard (µg/L) | EPA Residential MCL Groundwater Standard (µg/L) | Property Sample ID Location Date Units | R1-99 | R1-99 | R1-105 | R1-111 | R1-111 |
|---|---|--|--|-----------------|---------------|----------------|----------------|----------------|
| | | | | R199-SW01-W11-0 | R199-SU-F11-0 | R1105-SU-W11-0 | R1111-SU-W11-0 | R1111-SU-F11-0 |
| | | | | Sump Water | Sump Water | Sump Water | Sump Water | Sump Water |
| | | | | 3/23/2011 | 12/08/2011 | 3/26/2011 | 3/23/2011 | 12/08/2011 |
| | | | | (µg/L) | (µg/L) | (µg/L) | (µg/L) | (µg/L) |
| cis-1,2-Dichloroethene | 70 | 70 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethene | 5 | 5 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | 100 | 100 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Trichloroethene | 5 | 5 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Vinyl chloride | 2 | 2 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dichloroethene | 70* | 70* | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

ND (0.2) = Not Detected at concentration in parentheses

MCL = Maximum Contaminant Level

(µg/L) = micrograms/liter

MSC = Medium Specific Concentration

*cis-1,2-dichloroethene values have been used

Appendix B-2
Sump Water Lab Results
Tobyhanna Army Depot
Tobyhanna, PA

| BASEMENT WATER SAMPLES Vapor Intrusion Contaminants of Concern | PA Act 2 Residential MSC Groundwater Standard (µg/L) | EPA Residential MCL Groundwater Standard (µg/L) | Property Sample ID Location Date Units | R1-112A | R1-112A Duplicate Sample | R1-112A Trip Blank | R1-112A | R1-112A Trip Blank |
|---|---|--|--|-----------------|-----------------------------|-----------------------|-----------------|-----------------------|
| | | | | R1112A-SU-W11-0 | R1112A-SU-W11-1 | R1112A-SU-W11-1 | R1112A-SU-F11-0 | R1112A-SU-F11-3 |
| | | | | Sump Water | Sump Water | Trip Blank | Sump Water | Trip Blank |
| | | | | 3/23/2011 | 3/23/2011 | 3/23/2011 | 12/08/2011 | 12/08/2011 |
| | | | | (µg/L) | (µg/L) | (µg/L) | (µg/L) | (µg/L) |
| cis-1,2-Dichloroethene | 70 | 70 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethene | 5 | 5 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | 100 | 100 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Trichloroethene | 5 | 5 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Vinyl chloride | 2 | 2 | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,2-Dichloroethene | 70* | 70* | | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

ND (0.2) = Not Detected at concentration in parentheses

MCL = Maximum Contaminant Level

(µg/L) = micrograms/liter

MSC = Medium Specific Concentration

*cis-1,2-dichloroethene values have been used

Appendix B-3
Vapor Intrusion Lab Results
Tobyhanna Army Depot
Tobyhanna, PA

| INDOOR AIR SAMPLES Vapor Intrusion Contaminants of Concern | PA Act 2 Residential MSC ^{IAQ} Indoor Air Standard ^a (µg/m ³) | ORNL Residential Air RSL Indoor Air Standard ^b (µg/m ³) | Property & Sample Matrix Sample ID Location Date Units | R1-99 Indoor Air | R1-99 Indoor Air Dup | R1-99 Indoor Air | R1-99 Indoor Air | R1-99 Indoor Air |
|--|--|---|---|----------------------|-------------------------|----------------------|----------------------|----------------------|
| | | | | R199-IAB-W11-0 | R199-IAB-W11-1 | R199-IAF01-W11-0 | R199-IAB-F11-1 | R199-IAF-F11-0 |
| | | | | Basement | Basement | First Floor | Basement | First Floor |
| | | | | 3/23/2011 | 3/23/2011 | 3/23/2011 | 12/08/2011 | 12/08/2011 |
| | | | | (µg/m ³) | (µg/m ³) | (µg/m ³) | (µg/m ³) | (µg/m ³) |
| cis-1,2-Dichloroethene | 49 ^c | 63 ^d | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) |
| Tetrachloroethene (PCE) | 36 | 0.41 | c | ND (0.41) | ND (0.41) | ND (0.41) | ND (0.41) | 0.51 (0.41) |
| trans-1,2-Dichloroethene | 97 | 63 | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) |
| Trichloroethene (TCE) | 12 | 0.43 | c | ND (0.32) | ND (0.32) | ND (0.32) | ND (0.32) | 0.42 (0.32) |
| Vinyl chloride | 2.4 | 0.16 | c | ND (0.15) | ND (0.15) | ND (0.15) | ND (0.15) | ND (0.15) |
| 1,2-dichloroethene | 49 ^c | 63 ^d | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) |

MSC_{IAQ} = medium specific concentration for indoor air quality

RSL = regional screening level

ND (0.2) = Not Detected at concentration in parentheses

(µg/m³) = micrograms/meter cubed

^aAll soil gas and indoor air criteria from *PADEP Technical Guidance Manual* (PADEP, 2004)

^bResident Air value from ORNL Regional Screening Level (RSL) Summary Table (November 2011) (EPA, 2011a)

^ccis-1,2-dichloroethene values have been used

^dtrans-1,2-dichloroethene values have been used

c = Cancer effects at a target risk of 1.0E-06.

n= Noncancer effects, at a target hazard quotient of 1.0.

Shaded values are above residential standard

Appendix B-3
Vapor Intrusion Lab Results
Tobyhanna Army Depot
Tobyhanna, PA

| INDOOR AIR SAMPLES Vapor Intrusion Contaminants of Concern | PA Act 2 Residential MSC ^{IAQ} Indoor Air Standard ^a (µg/m ³) | ORNL Residential Air RSL Indoor Air Standard ^b (µg/m ³) | Property & Sample Matrix Sample ID Location Date Units | R1-105 Indoor Air | R1-105 Indoor Air | R1-105 Indoor Air |
|--|--|---|---|----------------------|----------------------|----------------------|
| | | | | R1105-IAB-W11-0 | R1105-IAF-W11-0 | R1105A-IAF-F11-0 |
| | | | | Basement | First Floor | First Floor |
| | | | | 3/26/2011 | 3/26/2011 | 12/09/2011 |
| | | | | (µg/m ³) | (µg/m ³) | (µg/m ³) |
| cis-1,2-Dichloroethene | 49 ^c | 63 ^d n | | ND (0.24) | ND (0.24) | ND (0.24) |
| Tetrachloroethene (PCE) | 36 | 0.41 c | | ND (0.41) | ND (0.41) | ND (0.41) |
| trans-1,2-Dichloroethene | 97 | 63 n | | ND (0.24) | ND (0.24) | ND (0.24) |
| Trichloroethene (TCE) | 12 | 0.43 c | | ND (0.32) | ND (0.32) | ND (0.32) |
| Vinyl chloride | 2.4 | 0.16 c | | ND (0.15) | ND (0.15) | ND (0.15) |
| 1,2-dichloroethene | 49 ^c | 63 ^d n | | ND (0.24) | ND (0.24) | ND (0.24) |

MSC_{IAQ} = medium specific concentration for indoor air quality

RSL = regional screening level

ND (0.2) = Not Detected at concentration in parentheses

(µg/m³) = micrograms/meter cubed

^aAll soil gas and indoor air criteria from *PADEP Technical Guidance Manual*
(PADEP, 2004)

^bResident Air value from ORNL Regional Screening Level (RSL) Summary Table
(November 2011) (EPA, 2011a)

^ccis-1,2-dichloroethene values have been used

^dtrans-1,2-dichloroethene values have been used

c = Cancer effects at a target risk of 1.0E-06.

n = Noncancer effects, at a target hazard quotient of 1.0.

Shaded values are above residential standard

Appendix B-3
Vapor Intrusion Lab Results
Tobyhanna Army Depot
Tobyhanna, PA

| INDOOR AIR SAMPLES Vapor Intrusion Contaminants of Concern | PA Act 2 Residential MSC ^{IAQ} Indoor Air Standard ^a (µg/m ³) | ORNL Residential Air RSL Indoor Air Standard ^b (µg/m ³) | Property & Sample Matrix Sample ID Location Date Units | R1-111 Indoor Air | R1-111 Indoor Air | R1-111 Indoor Air | R1-111 Indoor Air | R1-111 Indoor Air |
|--|--|---|---|----------------------|----------------------|----------------------|----------------------|----------------------|
| | | | | R1111-IAB-W11-0 | R1111-IAF-W11-0 | R1111-IAB-F11-0 | R1111-IAB-F11-1 | R1111-IAF-F11-0 |
| | | | | Basement | First Floor | Basement | Basement | First Floor |
| | | | | 3/23/2011 | 3/23/2011 | 12/08/2011 | 12/08/2011 | 12/08/2011 |
| | | | | (µg/m ³) | (µg/m ³) | (µg/m ³) | (µg/m ³) | (µg/m ³) |
| cis-1,2-Dichloroethene | 49 ^c | 63 ^d | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.79) |
| Tetrachloroethene (PCE) | 36 | 0.41 | c | ND (0.41) | ND (0.41) | 1.3 (0.41) | ND (0.41) | ND (1.41) |
| trans-1,2-Dichloroethene | 97 | 63 | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.79) |
| Trichloroethene (TCE) | 12 | 0.43 | c | ND (0.32) | ND (0.32) | ND (0.32) | ND (0.32) | 52 (0.32) |
| Vinyl chloride | 2.4 | 0.16 | c | ND (0.15) | ND (0.15) | ND (0.15) | ND (0.15) | ND (0.15) |
| 1,2-dichloroethene | 49 ^c | 63 ^d | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) |

MSC_{IAQ} = medium specific concentration for indoor air quality

RSL = regional screening level

ND (0.2) = Not Detected at concentration in parentheses

(µg/m³) = micrograms/meter cubed

^aAll soil gas and indoor air criteria from *PADEP Technical Guidance Manual* (PADEP, 2004)

^bResident Air value from ORNL Regional Screening Level (RSL) Summary Table (November 2011) (EPA, 2011a)

^ccis-1,2-dichloroethene values have been used

^dtrans-1,2-dichloroethene values have been used

c = Cancer effects at a target risk of 1.0E-06.

n= Noncancer effects, at a target hazard quotient of 1.0.

Shaded values are above residential standard

Appendix B-3
Vapor Intrusion Lab Results
Tobyhanna Army Depot
Tobyhanna, PA

| INDOOR AIR SAMPLES Vapor Intrusion Contaminants of Concern | PA Act 2 Residential MSC ^{IAQ} Indoor Air Standard ^a (µg/m ³) | ORNL Residential Air RSL Indoor Air Standard ^b (µg/m ³) | Property & Sample Matrix Sample ID Location Date Units | R1-112A | R1-112A | R1-112A | R1-112A | R1-112A |
|--|--|---|---|-----------------|-----------------|------------------|------------------|------------------|
| | | | | Indoor Air | Indoor Air | Indoor Air | Indoor Air | Indoor Air Dup |
| | | | | R1112-IAB-W11-0 | R1112-IAF-W11-0 | R1112A-IAB-F11-0 | R1112A-IAF-F11-0 | R1112A-IAF-F11-1 |
| | | | | Basement | First Floor | Basement | First Floor | First Floor |
| | | | | 3/23/2011 | 3/23/2011 | 12/09/2011 | 12/09/2011 | 12/09/2011 |
| cis-1,2-Dichloroethene | 49 ^c | 63 ^d | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) |
| Tetrachloroethene (PCE) | 36 | 0.41 | c | ND (0.41) | ND (0.41) | ND (0.41) | ND (0.41) | ND (0.41) |
| trans-1,2-Dichloroethene | 97 | 63 | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) |
| Trichloroethene (TCE) | 12 | 0.43 | c | ND (0.32) | ND (0.32) | ND (0.32) | ND (0.32) | ND (0.32) |
| Vinyl chloride | 2.4 | 0.16 | c | ND (0.15) | ND (0.15) | ND (0.15) | ND (0.15) | ND (0.15) |
| 1,2-dichloroethene | 49 ^c | 63 ^d | n | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) | ND (0.24) |

MSC_{IAQ} = medium specific concentration for indoor air quality

RSL = regional screening level

ND (0.2) = Not Detected at concentration in parentheses

(µg/m³) = micrograms/meter cubed

^aAll soil gas and indoor air criteria from *PADEP Technical Guidance Manual* (PADEP, 2004)

^bResident Air value from ORNL Regional Screening Level (RSL) Summary Table (November 2011) (EPA, 2011a)

^ccis-1,2-dichloroethene values have been used

^dtrans-1,2-dichloroethene values have been used

c = Cancer effects at a target risk of 1.0E-06.

n= Noncancer effects, at a target hazard quotient of 1.0.

Shaded values are above residential standard

Round 1

March 2011

Ambient Air

PCE = **0.44 ug/m³** TCE = ND

First Floor Air

PCE = ND TCE = ND

Basement Air

PCE = ND TCE = ND

▲ PCE = ND TCE = ND

Sump Water

PCE = ND TCE = ND



Round 2

December 2011

Ambient Air

PCE = ND TCE = **1.1 ug/m³**

First Floor Air

PCE = **0.51 ug/m³** TCE = **0.42 ug/m³**

Basement Air

PCE = ND TCE = ND

Sump Water

PCE = ND TCE = ND

Round 1

March 2011

Ambient Air

NC

First Floor Air

PCE = ND TCE = ND

Basement Air

PCE = ND TCE = ND

Sump Water

PCE = ND TCE = ND



Round 2

December 2011

Ambient Air

NC

First Floor Air

PCE = ND TCE = **52 ug/m³**

Basement Air

PCE = **1.3 ug/m³** TCE = ND

▲ PCE = ND TCE = ND

Sump Water

PCE = ND TCE = ND

Legend:

ND = Non Detect

NC = Not Collected

Air Samples

PCE = Tetrachloroethene ug/m³ = micrograms per meter cubed

TCE = Trichloroethene = meter cubed

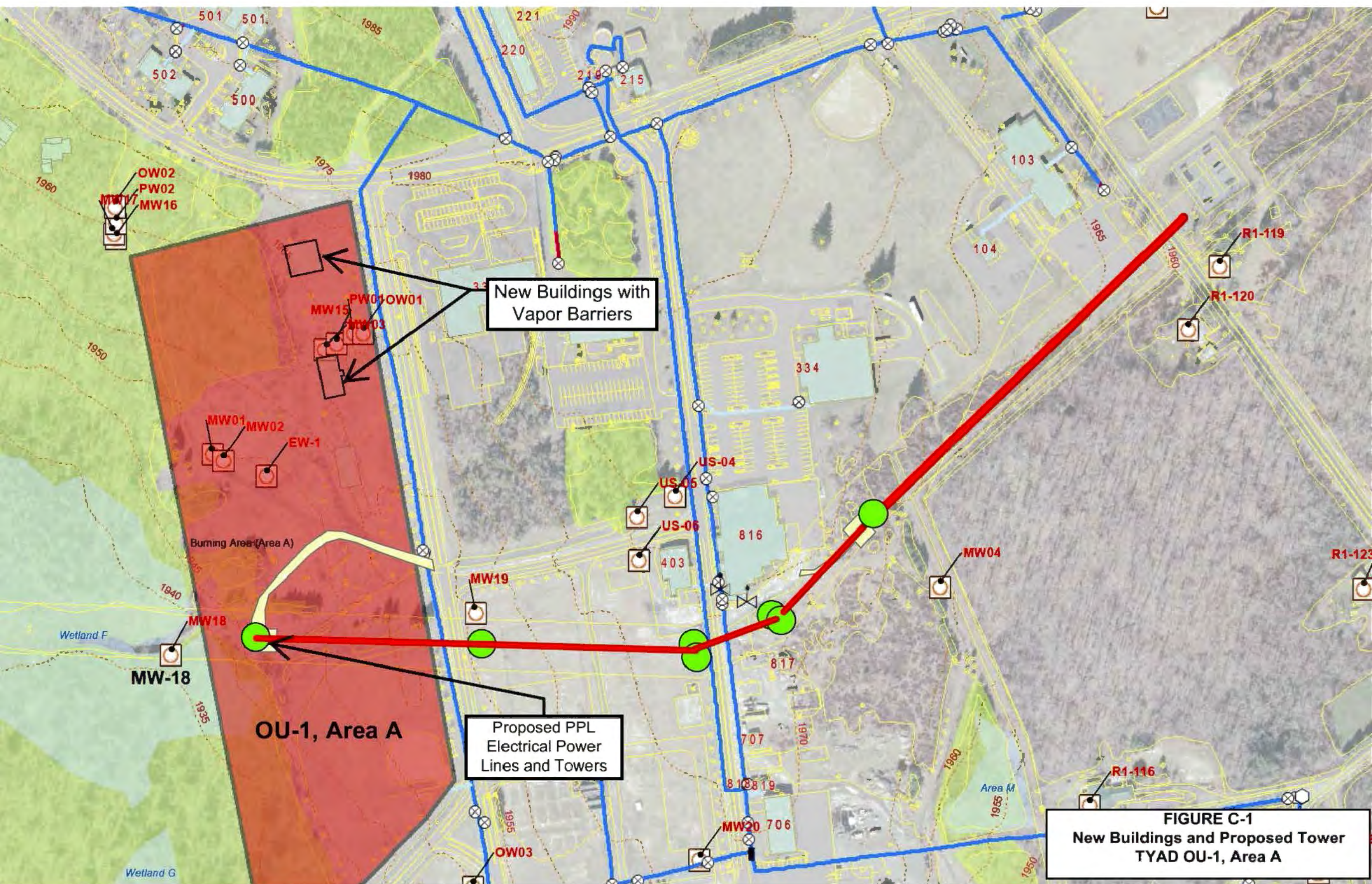
▲ = Duplicate Sample

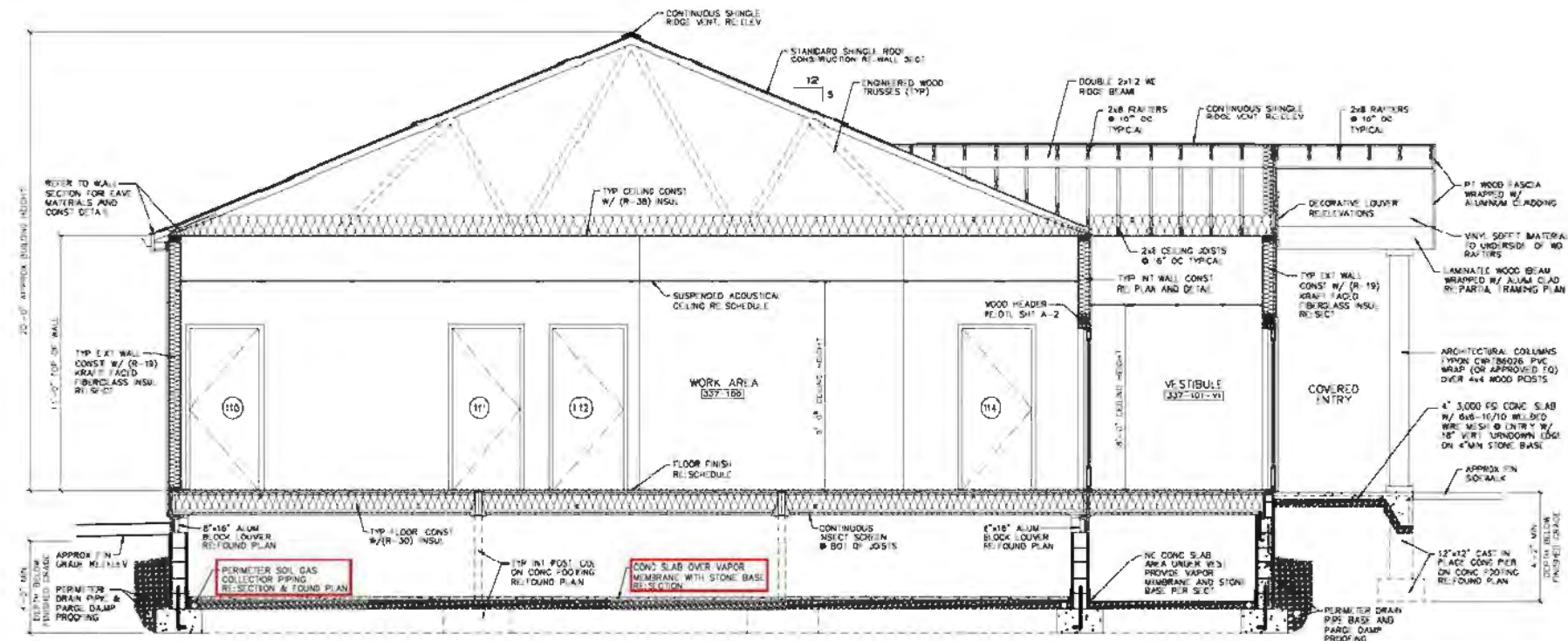
★ = Sample Location

FINAL

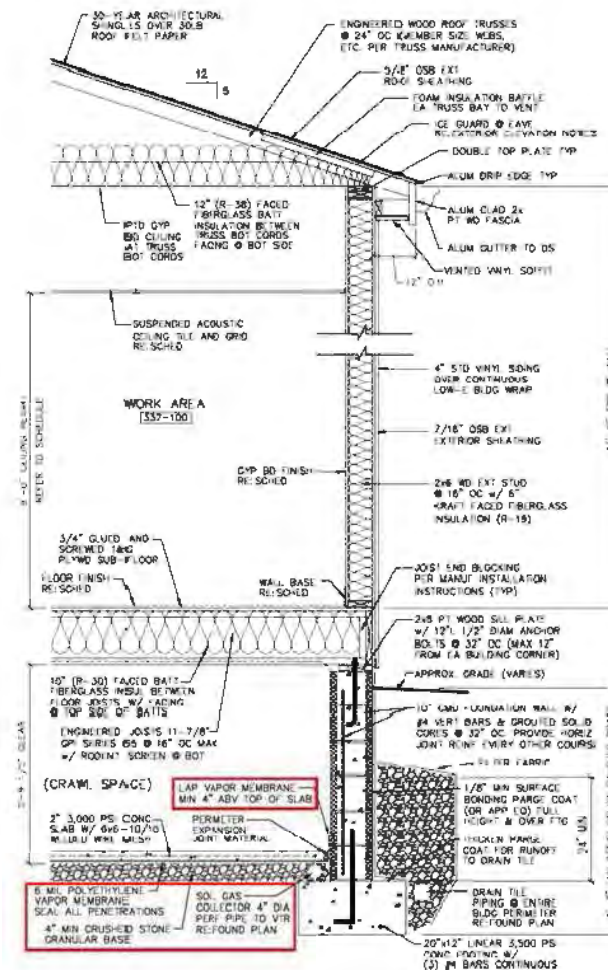
APPENDIX C

OU-1 AND OU-4 MEC AND NEW CONSTRUCTION INFORMATION








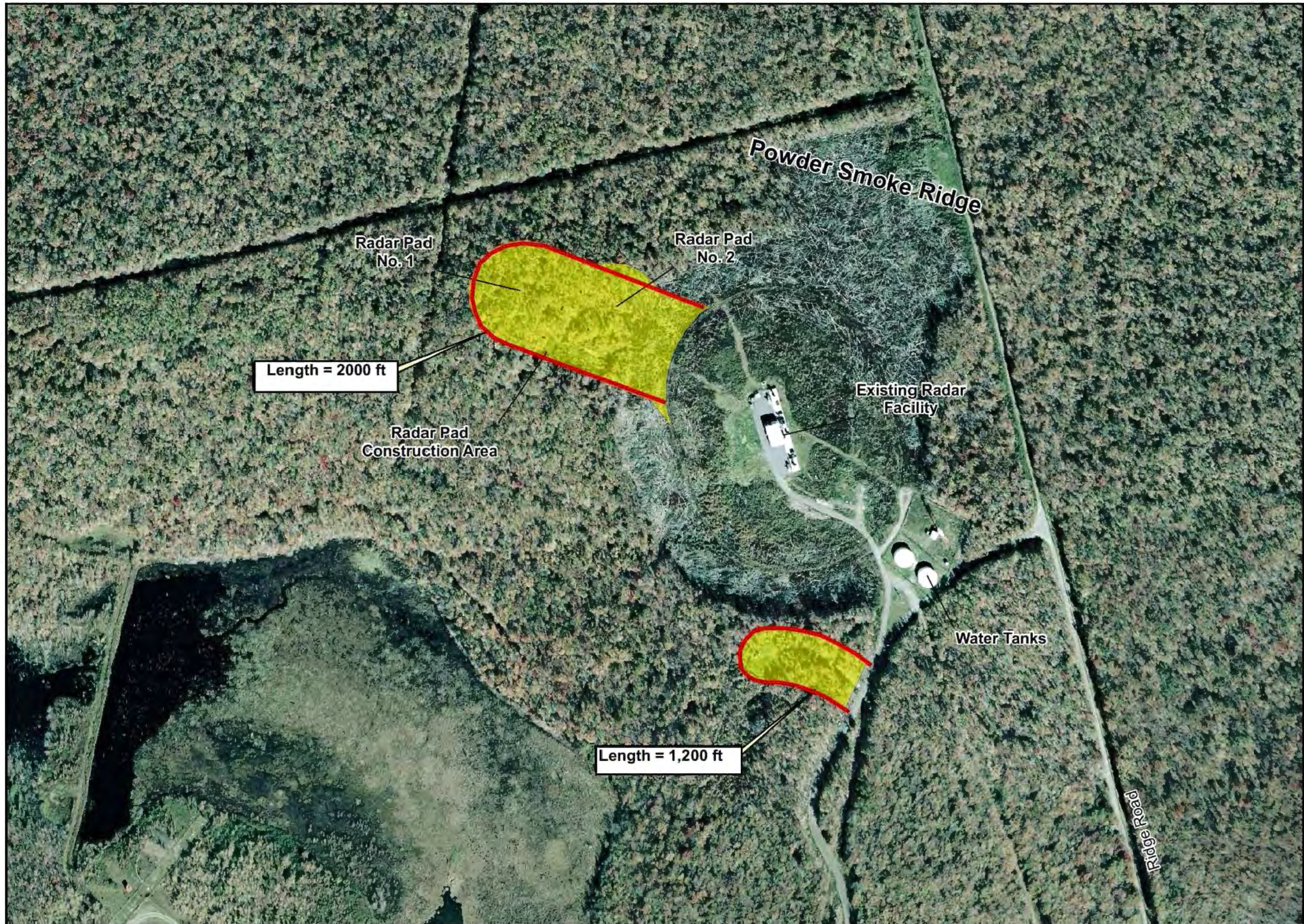
1 BUILDING SECTION
SCALE: 3/8" = 1'-0"



2 TYPICAL WALL SECTION
SCALE: 3/4" = 1'-0"

| | | | | | |
|--|--|--|--|-------------|---------------------|
|  | T - TITLE SHEET SUB LINE 1 (JOB NO.) SUB LINE 2 (SHEET NO.) (OPTIONAL SYMBOL) | | DATE CONSTRUCTION SET 6-15-11 RS | | |
| | DATE SUBMISSION 5-2-11 RS | | DATE APPROVAL | | |
| | SYMBOL | | DESCRIPTION | | |
| | REVISION | | | | |
|  | <div style="text-align: center;"> TOBYHANNA ARMY DEPOT DIRECTORATE OF PUBLIC WORKS TOBYHANNA, PENNSYLVANIA </div> | | | | |
| PROJECT: C4ISR ADMINISTRATION BUILDING SHEET: 337-1-5 DRAWN: BRANDON PEAK CHECKED: JIM SECOLOSKI DATE: 6-15-11 SCALE: AS NOTED SHEET NO: 4 PROJECT NO: 337-1-5 DRAWING NO: 337-1-5 | | <div style="text-align: center;"> C4ISR ADMINISTRATION BUILDING BUILDING AND WALL SECTIONS </div> | | | |
| BRANDON PEAK ARCHITECT | MAKE ALL REVISIONS JIM SECOLOSKI | DATE: 6-15-11 | SCALE: AS NOTED | SHEET NO: 4 | PROJECT NO: 337-1-5 |

| | | | |
|--|--|--|--|
|  <p>U.S. DEPARTMENT OF DEFENSE OFFICE OF THE SECRETARY OF DEFENSE OFFICE OF MILITARY CONSTRUCTION DIVISION OF CONSTRUCTION MANAGEMENT</p> | | <p>55% CONSTRUCTION SET</p> <p>4- 85-31 AS</p> | |
| <p>SYMBOL</p> | | <p>55% SUBMISSION</p> <p>5- 85-31 AS</p> | |
| <p>REVISION</p> | | <p>DATE</p> <p>APPROVAL</p> | |
| <p>TOBYHANNA ARMY DEPOT DIRECTORATE OF PUBLIC WORKS TOBYHANNA, PENNSYLVANIA</p> | | | |
| <p>C4ISR ADMINISTRATION BUILDING</p> | | | |
| <p>FOUNDATION, FLOOR AND PARTIAL ROOF FRAMING PLANS SCHEDULES AND DETAILS</p> | | | |
| <p>DATE</p> <p>6-15-31</p> | | <p>SCALE</p> <p>AS NOTED</p> | |
| <p>SHEET NO.</p> <p>4</p> | | <p>PROJECT NO.</p> <p>337-1-3</p> | |
| <p>DATE</p> <p>6/15/31</p> | | <p>PLT. SCALE: 1:60</p> | |
| <p>COR: JIM SECOLOSH</p> | | | |



Legend

- Access Road
- MEC Removal Area
- UXO - Barbed Wire Fence

Base Information:
Pennsylvania State Plane - North
NAD 83, U.S. Feet

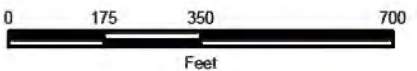
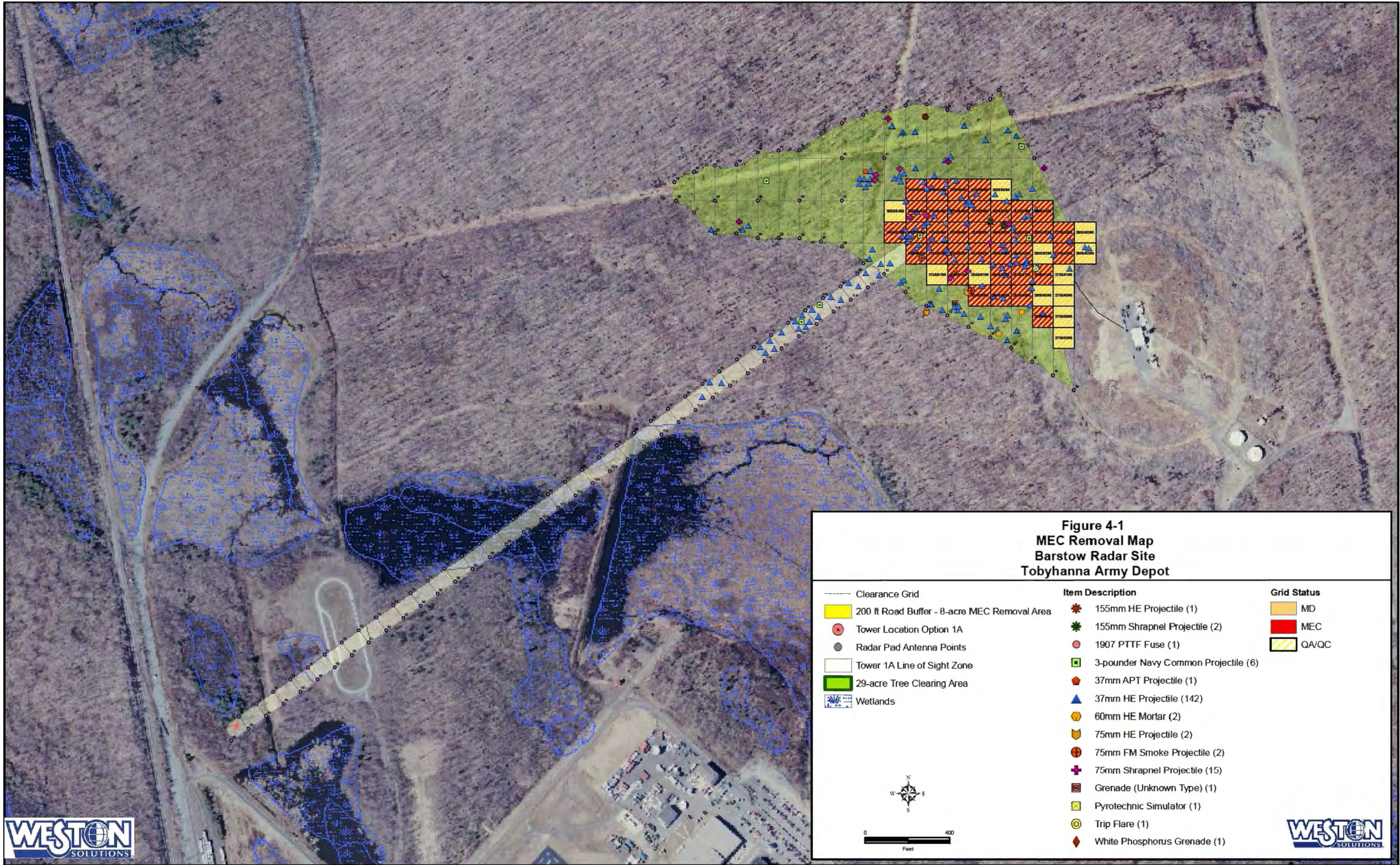


Figure 1

**TYAD UXO FENCE
INSTALLATION**

Tobyhanna Army Depot





Legend

- Surveyed
- Cleared (No MD or UXO Found)
- MD Found
- UXO Found

Items Found (Count)

- 155mm Shrapnel Projectile (0)
- 37mm HE Projectile (25)
- 60mm HE Mortar (1)
- 75mm Shrapnel Projectile (12)
- 81mm WP Mortar (1)

Base Information:
UTM, Z18N, NAD 83, Feet

Image Source:
2005 PAMAP

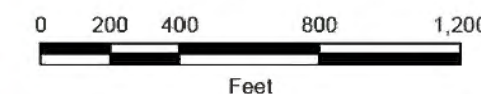


Figure 4-1
MEC Survey Grid Status Map
Seal Beach
Tobyhanna Army Depot, PA

Legend

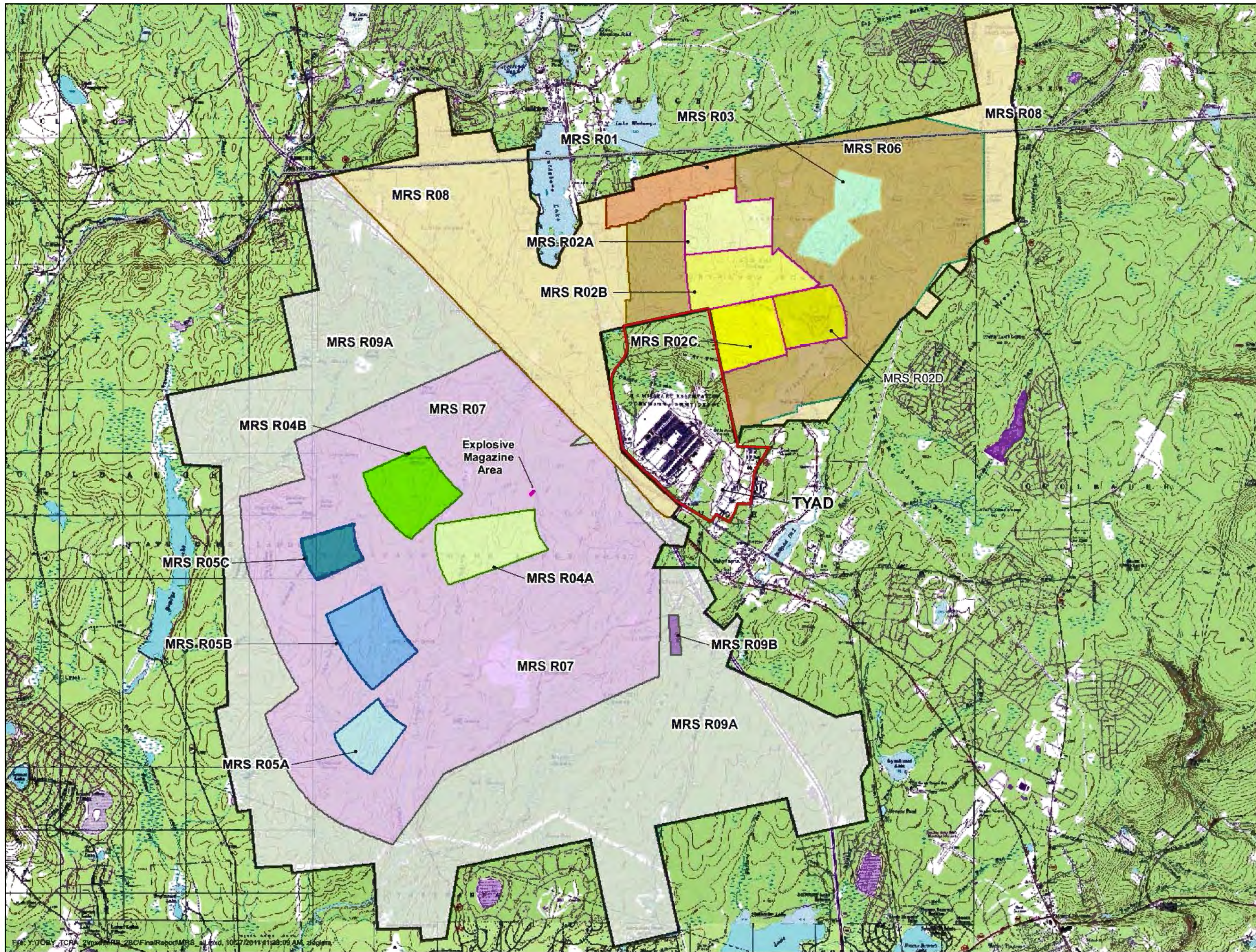
- Property Boundary
- Explosive Magazine Area
- FUDS Boundary
- County Line
- MRS R01
- MRS 2A
- MRS 2B
- MRS 2C
- MRS 2D
- MRS R03
- MRS 4A
- MRS 4B
- MRS 5A
- MRS 5B
- MRS 5C
- MRS R06
- MRS R08
- MRS R07
- MRS R09A
- MRS R09B



0 1,500 3,000 4,500 6,000 7,500 9,000
Feet

Figure C-7

TOAR FUDS MRS Locations



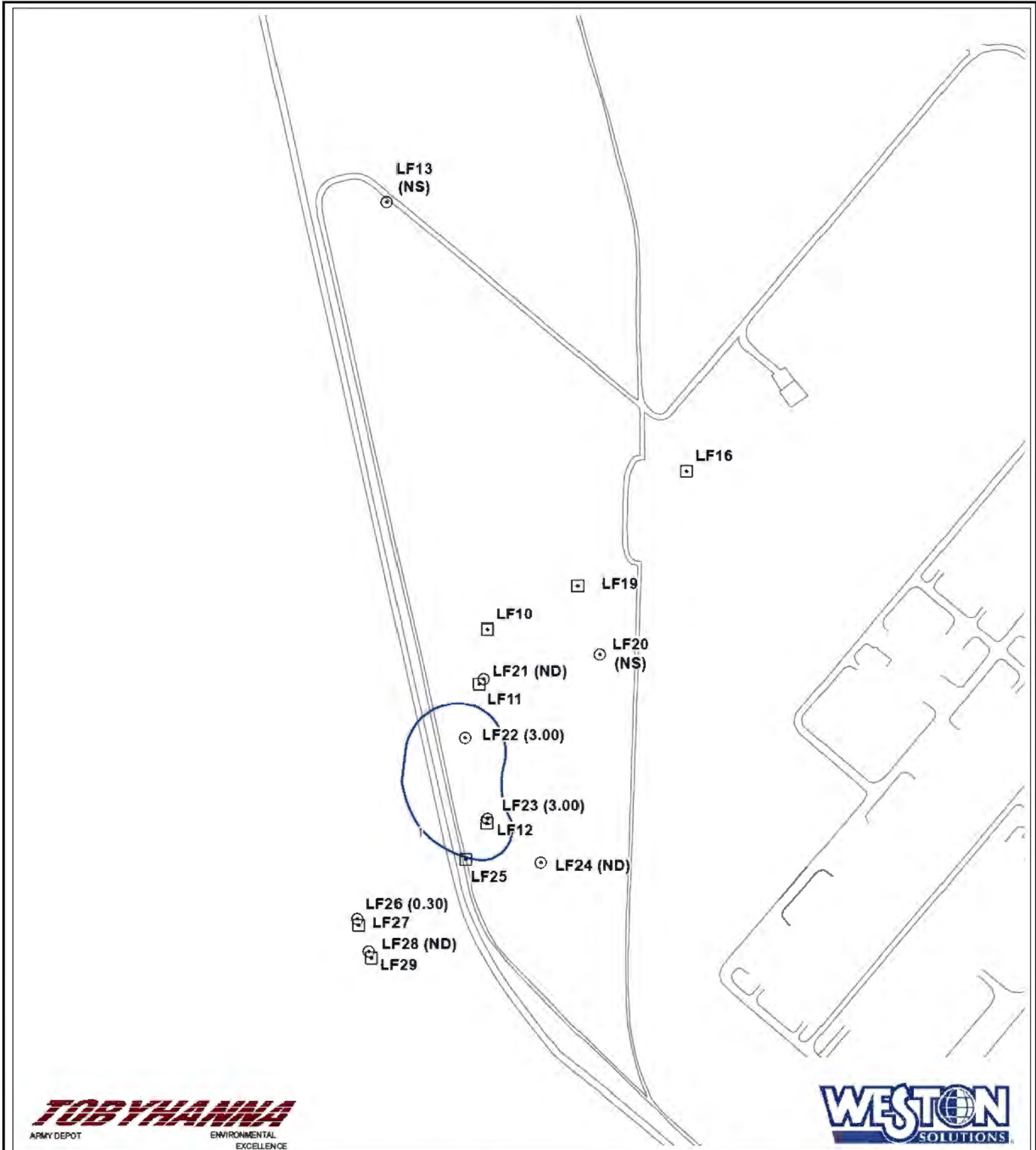
FINAL

APPENDIX D

OU-5 GROUNDWATER

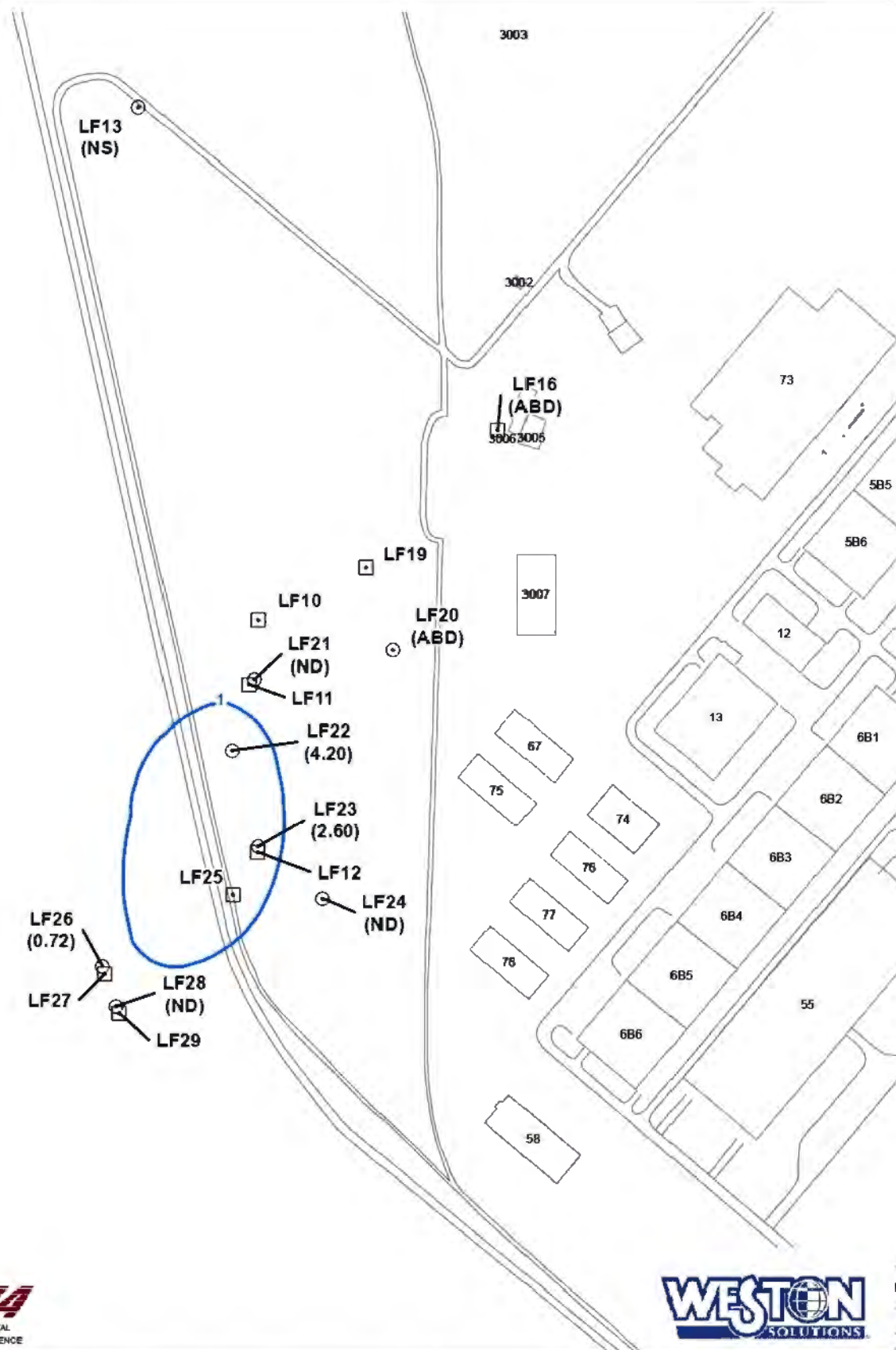
FINAL

OU-5 CONTAMINANT CONTOUR MAPS



Appendix D-1

Benzene Concentration
Contour, Glacial Till Aquifer
30 April - 16 May 2007



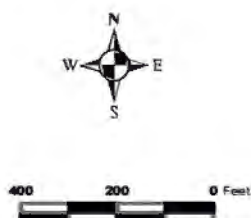
TOBYHANNA
ARMY DEPOT ENVIRONMENTAL EXCELLENCE

WESTON
SOLUTIONS

Legend:

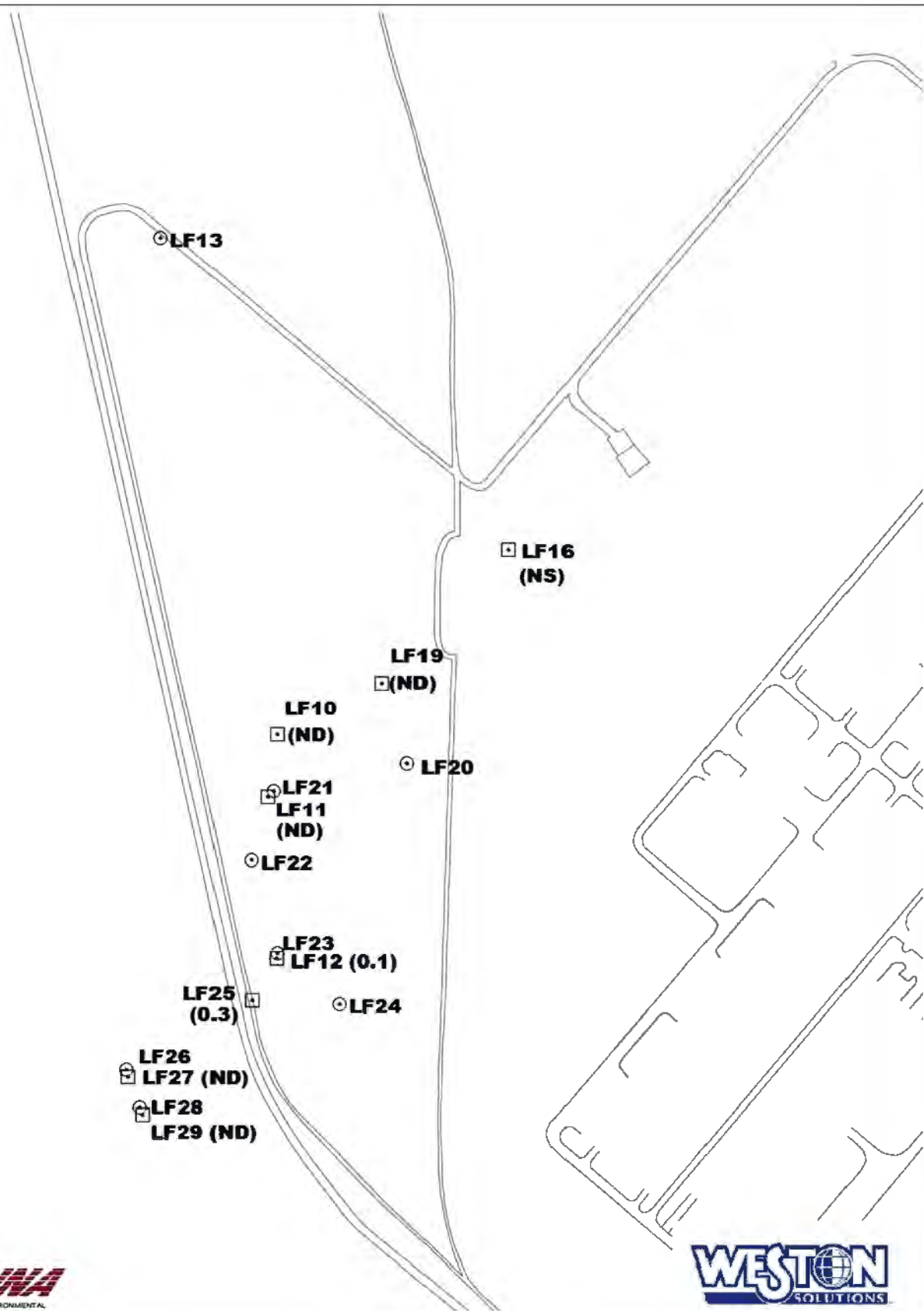
| | | |
|--------------------------|-----------|-----------------------|
| — (in parts per billion) | ND | Compound Not Detected |
| □ | NS | Not Sampled |
| ○ | | |

ABD Abandoned - November 2006



Appendix D-2

Benzene Concentration
Contour, Glacial Till Aquifer
November 2011



TOBYHANNA
ARMY DEPOT ENVIRONMENTAL EXCELLENCE

WESTON
SOLUTIONS

Legend:

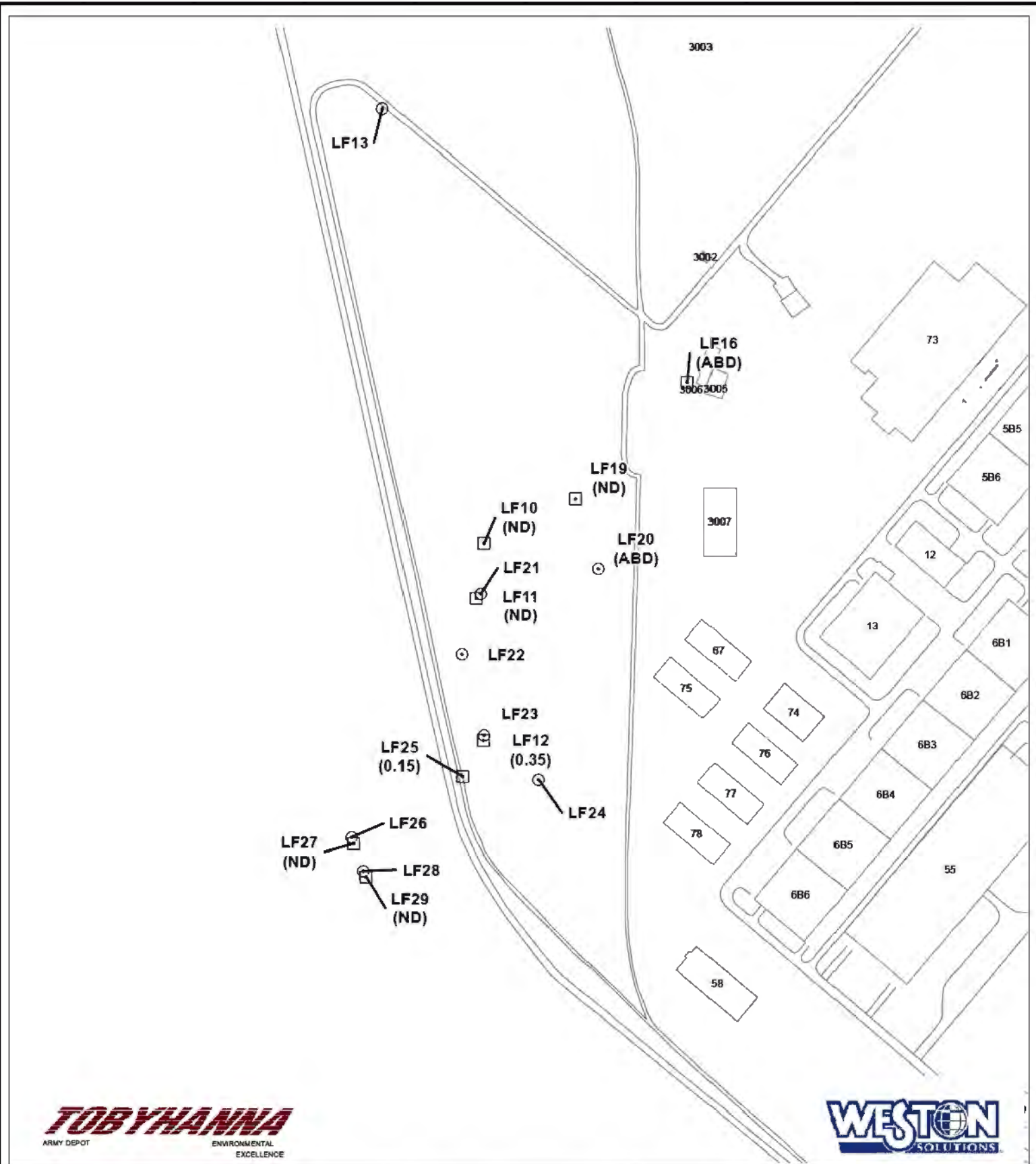
- Approximate Location of Bedrock Monitoring Well
- ⊙ Approximate Location of Glacial Till Monitoring Well

ND Compound Not Detected
NS Not Sampled



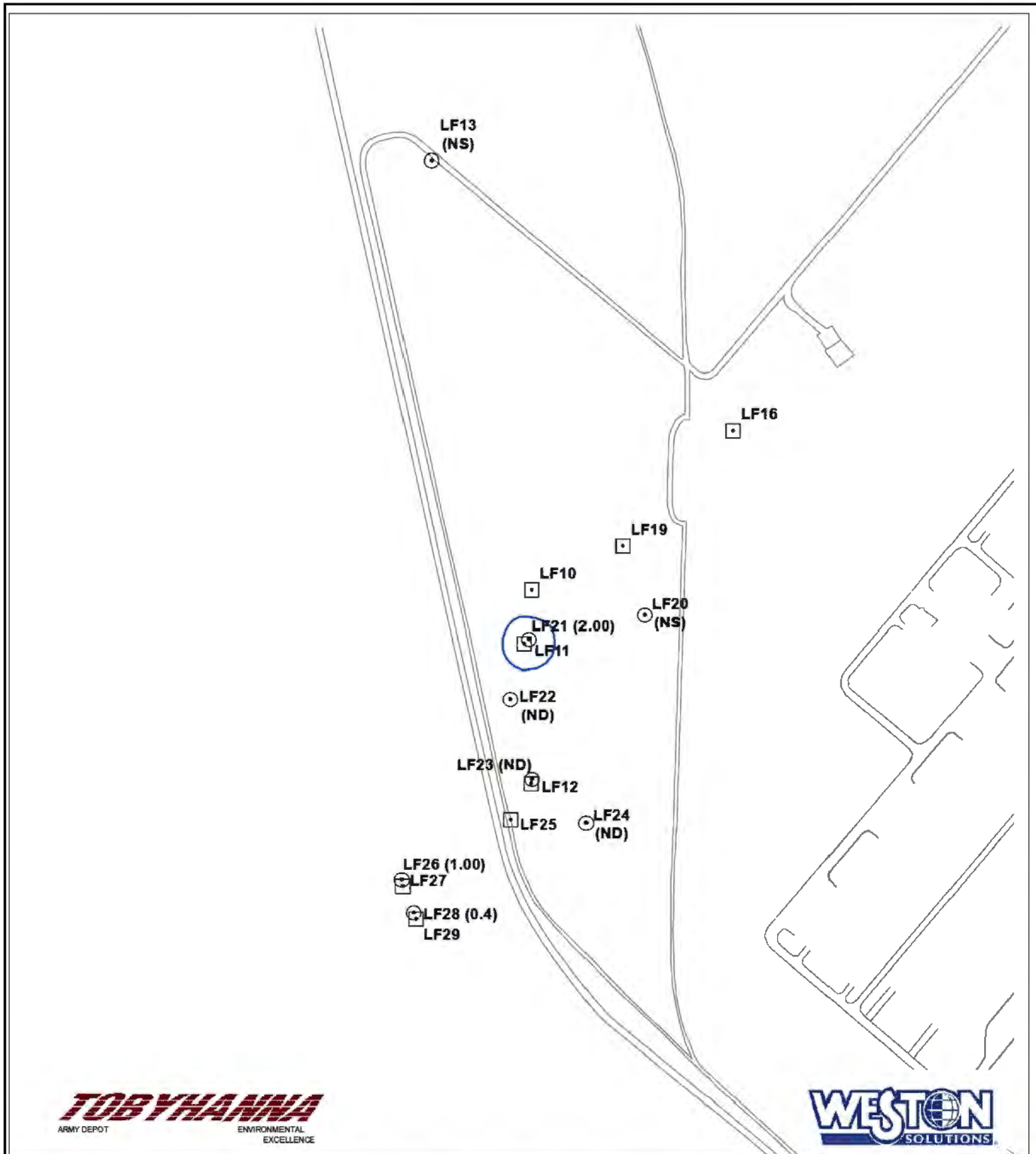
Appendix D-3

Benzene Concentration
Contour, Bedrock Aquifer
30 April - 16 May 2007



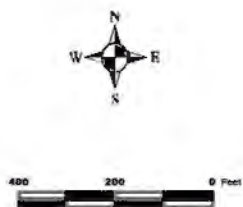
Appendix D-4

Benzene Concentration
Contour, Bedrock Aquifer
November 2011



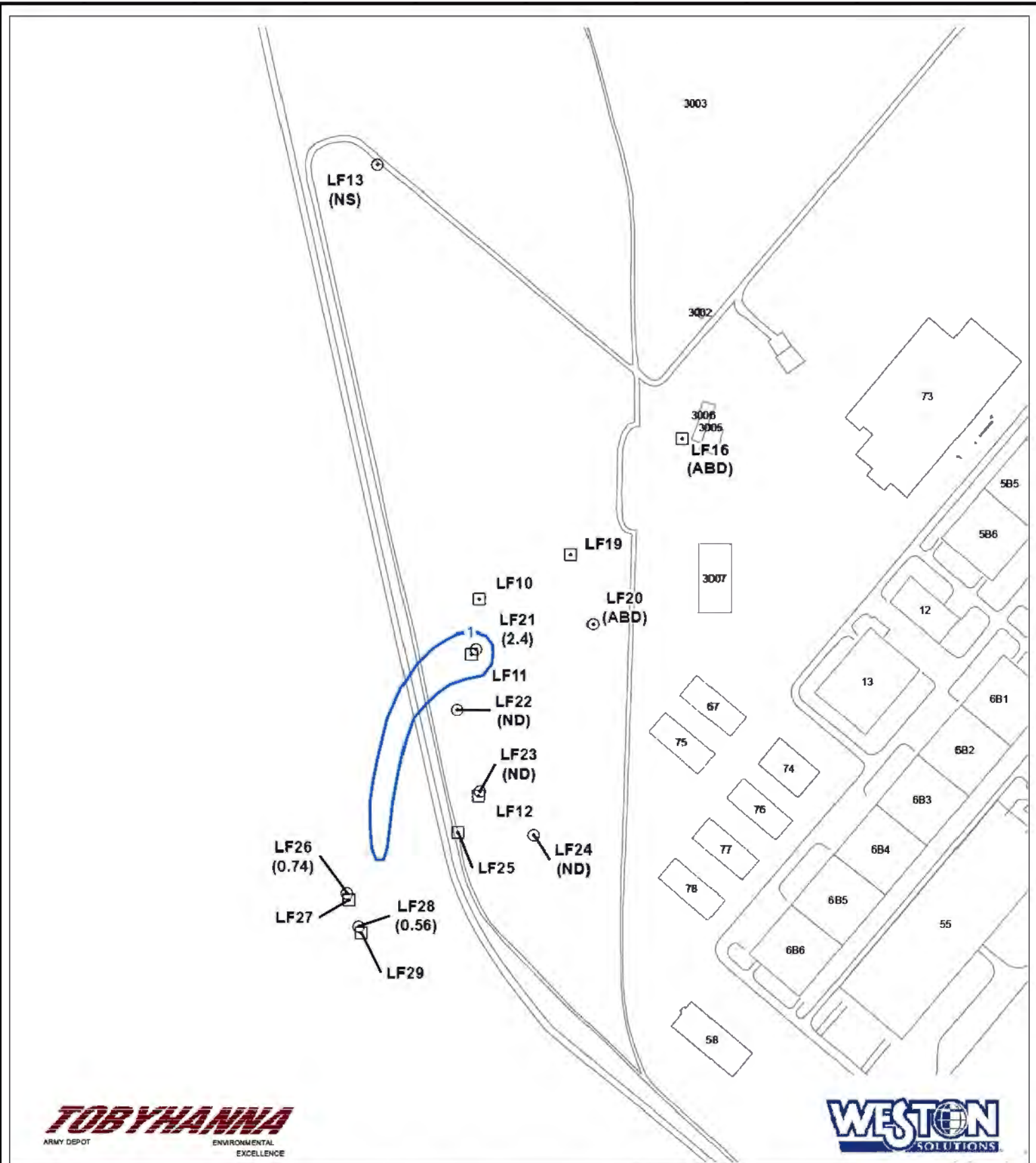
Legend:

- | | | | |
|-----|---|----|--------------------------|
| —+— | Contaminant Plume (in parts per billion) | ND | Compound Not Detected |
| □ | Approximate Location of Bedrock Monitoring Well | NS | Not Sampled |
| ⊙ | Approximate Location of Glacial Till Monitoring Well | | |

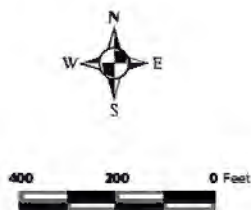


Appendix D-5

PCE Concentration
Contour, Glacial Till Aquifer
30 April - 16 May 2007

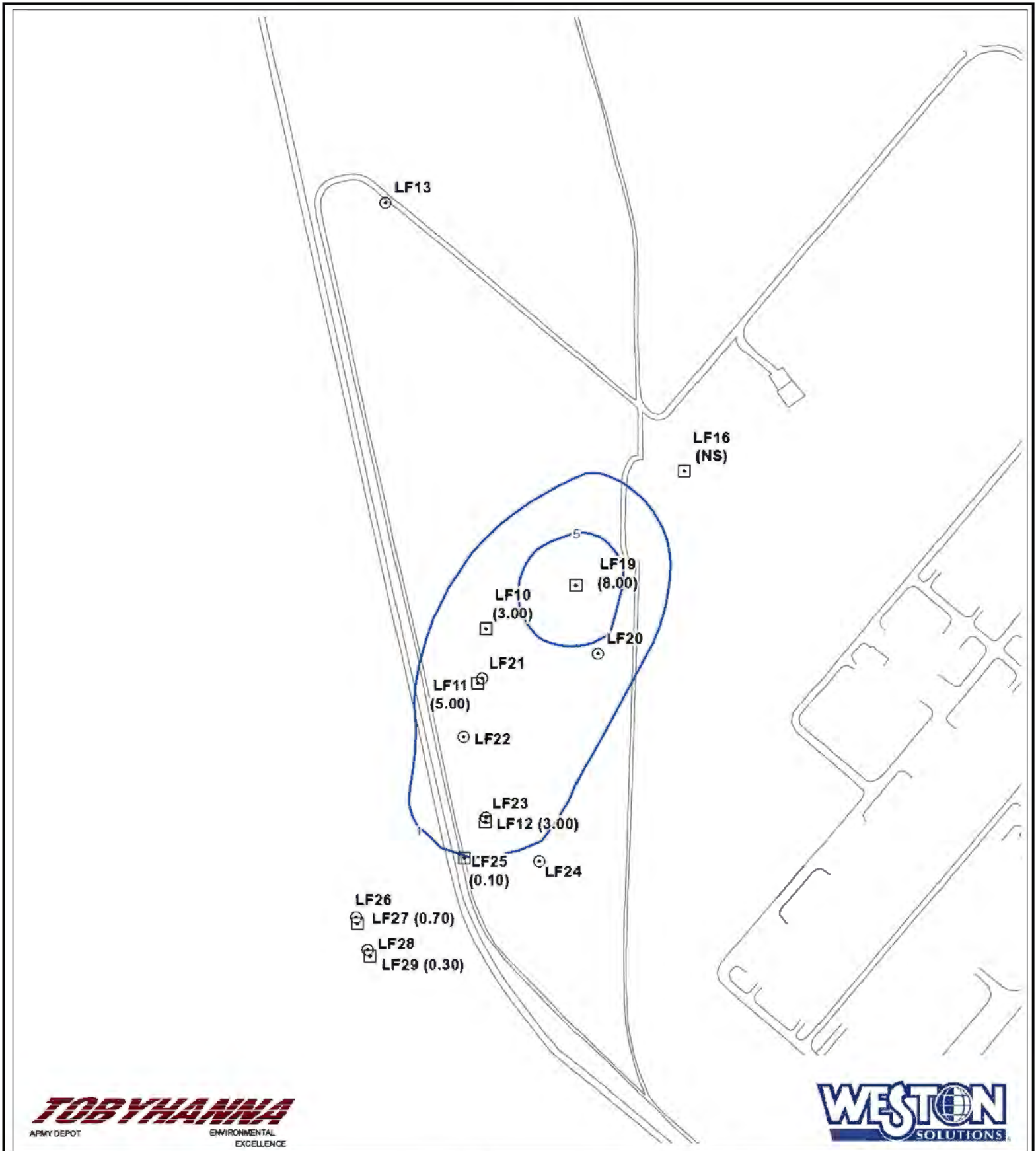


| | | |
|--------------------------------------|---|------------------------------------|
| Legend: | | |
| | Contaminant Plume (in parts per billion) | ND Compound Not Detected |
| | Approximate Location of Bedrock Monitoring Well | NS Not Sampled |
| | Approximate Location of Glacial Till Monitoring Well | |
| ABD Abandoned - November 2006 | | |



Appendix D-6

PCE Concentration
Contour, Glacial Till Aquifer
November 2011



Legend:

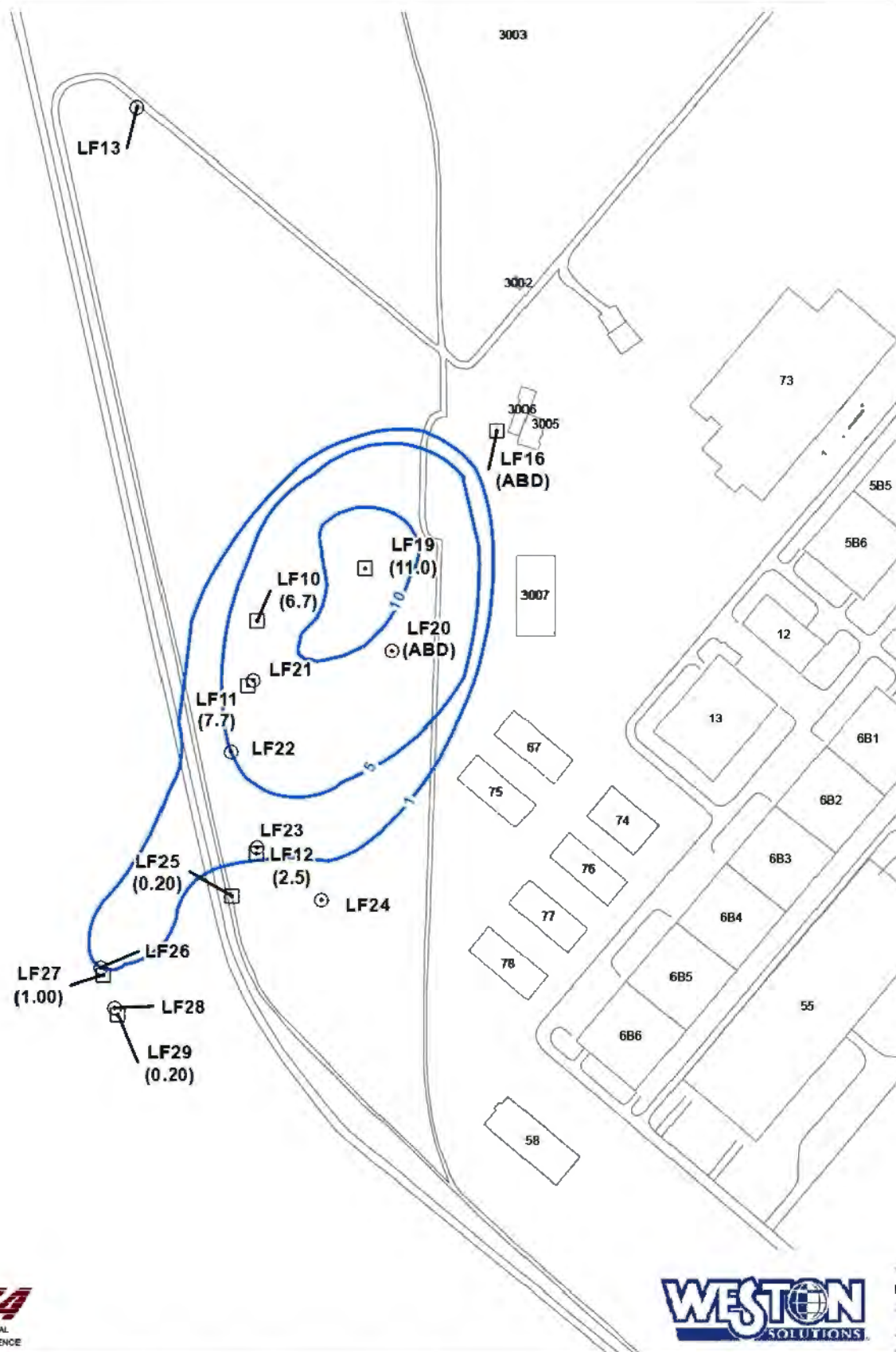
- 1 — Contaminant Plume
(in parts per billion)
- Approximate Location of
Bedrock Monitoring Well
- Approximate Location of
Glacial Till Monitoring Well

- ND Compound Not
Detected
- NS Not Sampled



Appendix D-7

PCE Concentration
Contour, Bedrock Aquifer
30 April - 16 May 2007

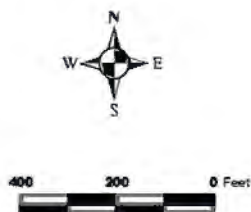


TOBYHANNA
ARMY DEPOT ENVIRONMENTAL EXCELLENCE

WESTON
SOLUTIONS

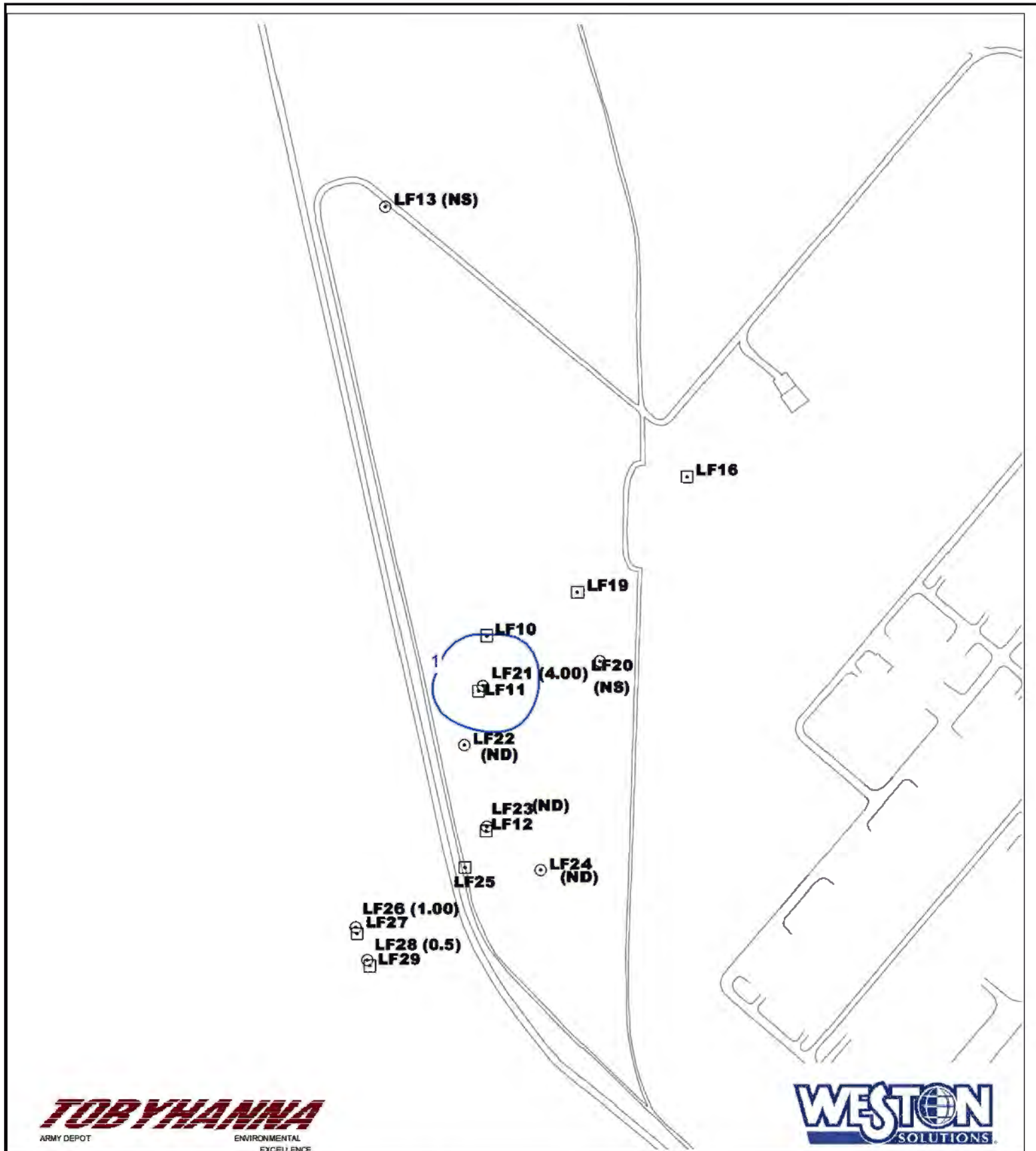
Legend:

- Contaminant Plume (in parts per billion)
- Approximate Location of Bedrock Monitoring Well
- Approximate Location of Glacial Till Monitoring Well
- ABD Abandoned - November 2006
- ND Compound Not Detected
- NS Not Sampled



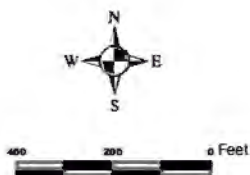
Appendix D-8

PCE Concentration
Contour, Bedrock Aquifer
November 2011



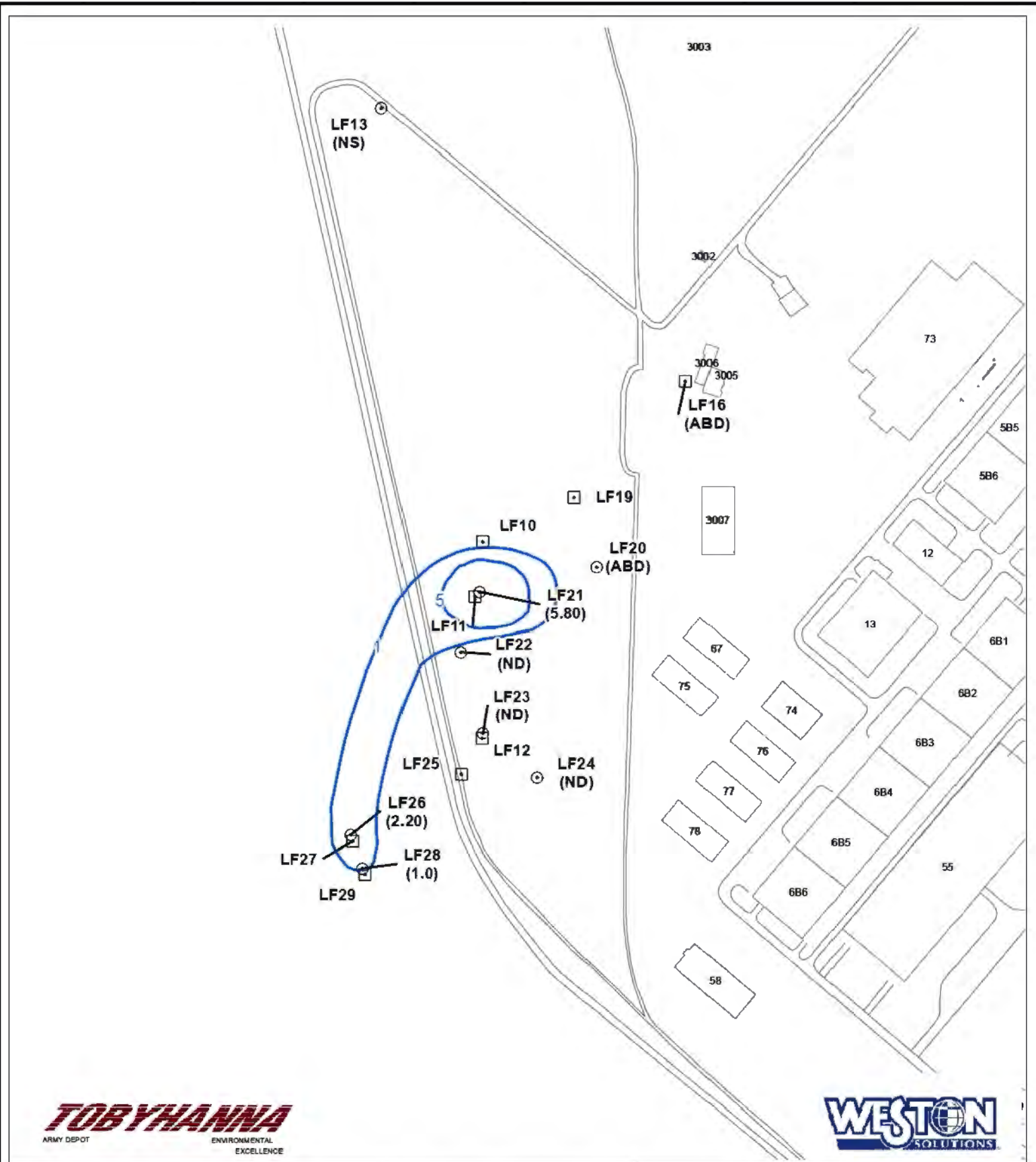
Legend:

- | | | | |
|-------|---|----|--------------------------|
| — 1 — | Contaminant Plume (in parts per billion) | ND | Compound Not Detected |
| □ | Approximate Location of Bedrock Monitoring Well | NS | Not Sampled |
| ⊙ | Approximate Location of Glacial Till Monitoring Well | | |

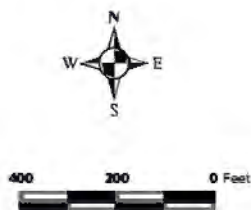


Appendix D-9

**TCE Concentration
Contour, Glacial Till Aquifer
30 April - 16 May 2007**

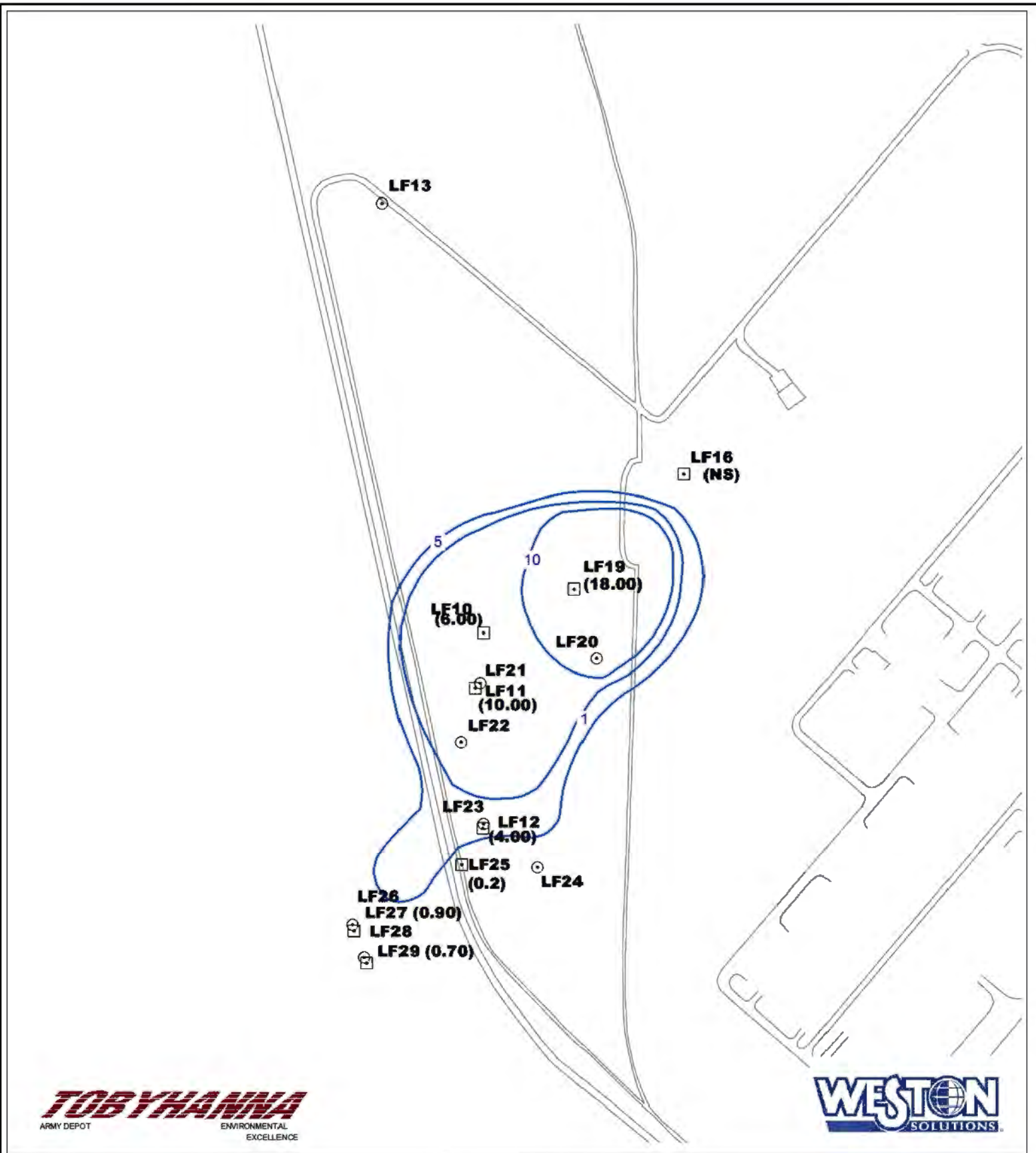


| | | |
|--------------------------------------|---|------------------------------------|
| Legend: | | |
| | Contaminant Plume (in parts per billion) | |
| | Approximate Location of Bedrock Monitoring Well | ND Compound Not Detected |
| | Approximate Location of Glacial Till Monitoring Well | NS Not Sampled |
| ABD Abandoned - November 2006 | | |



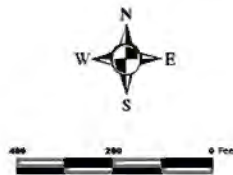
Appendix D-10

TCE Concentration
Contour, Glacial Till Aquifer
November 2011



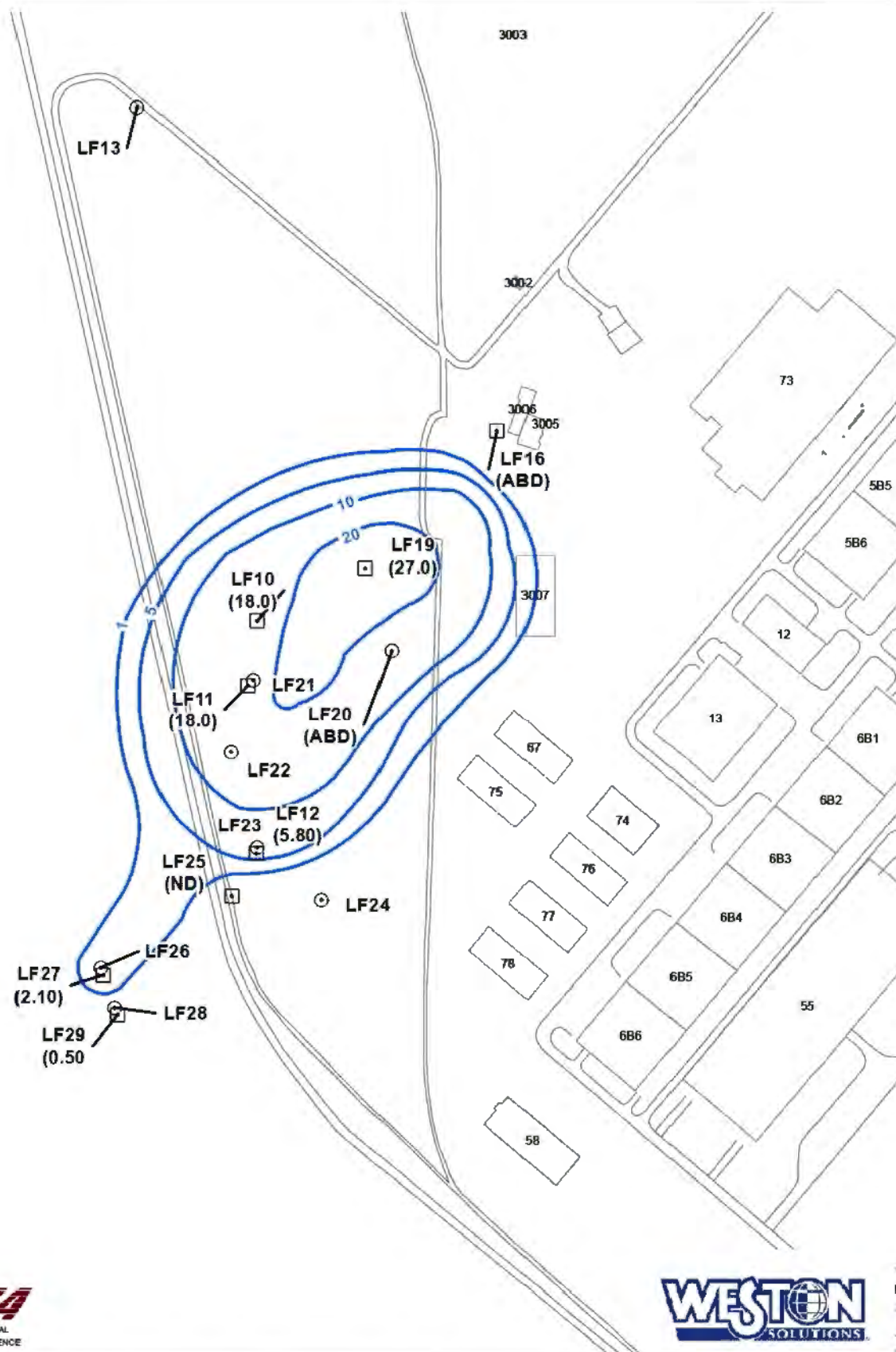
Legend:

- 1 — Contaminant Plume (in parts per billion)
- Approximate Location of Bedrock Monitoring Well
- ⊙ Approximate Location of Glacial Till Monitoring Well
- ND Compound Not Detected
- NS Not Sampled



Appendix D-11




TCE Concentration
Contour, Bedrock Aquifer
30 April - 16 May 2007



TOBYHANNA
ARMY DEPOT ENVIRONMENTAL EXCELLENCE

WESTON
SOLUTIONS

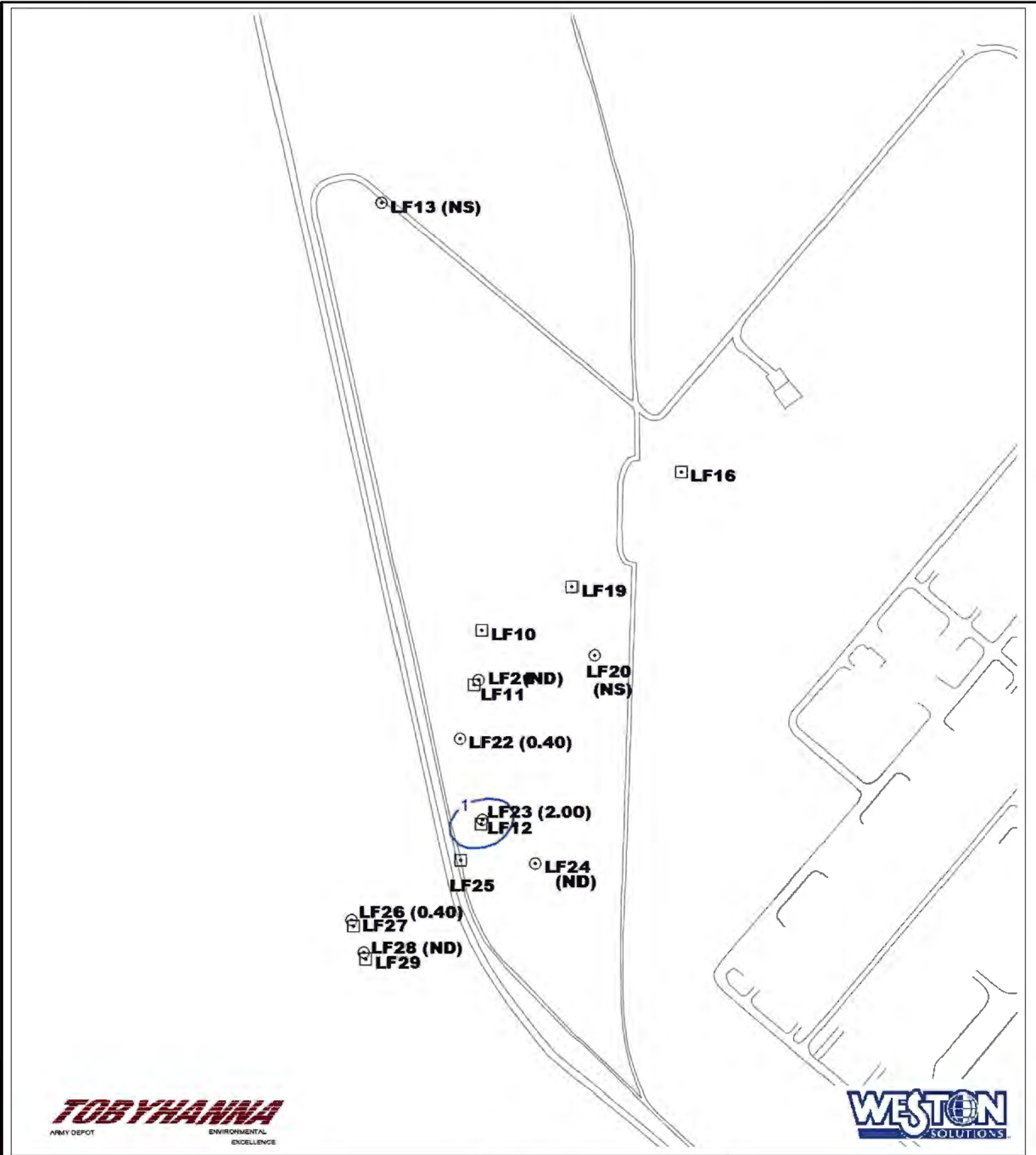
Legend:

-  Contaminant Plume (in parts per billion)
-  Approximate Location of Bedrock Monitoring Well
-  Approximate Location of Glacial Till Monitoring Well
- ABD** Abandoned - November 2006
- ND** Compound Not Detected
- NS** Not Sampled



Appendix D-12

TCE Concentration
Contour, Bedrock Aquifer
November 2011



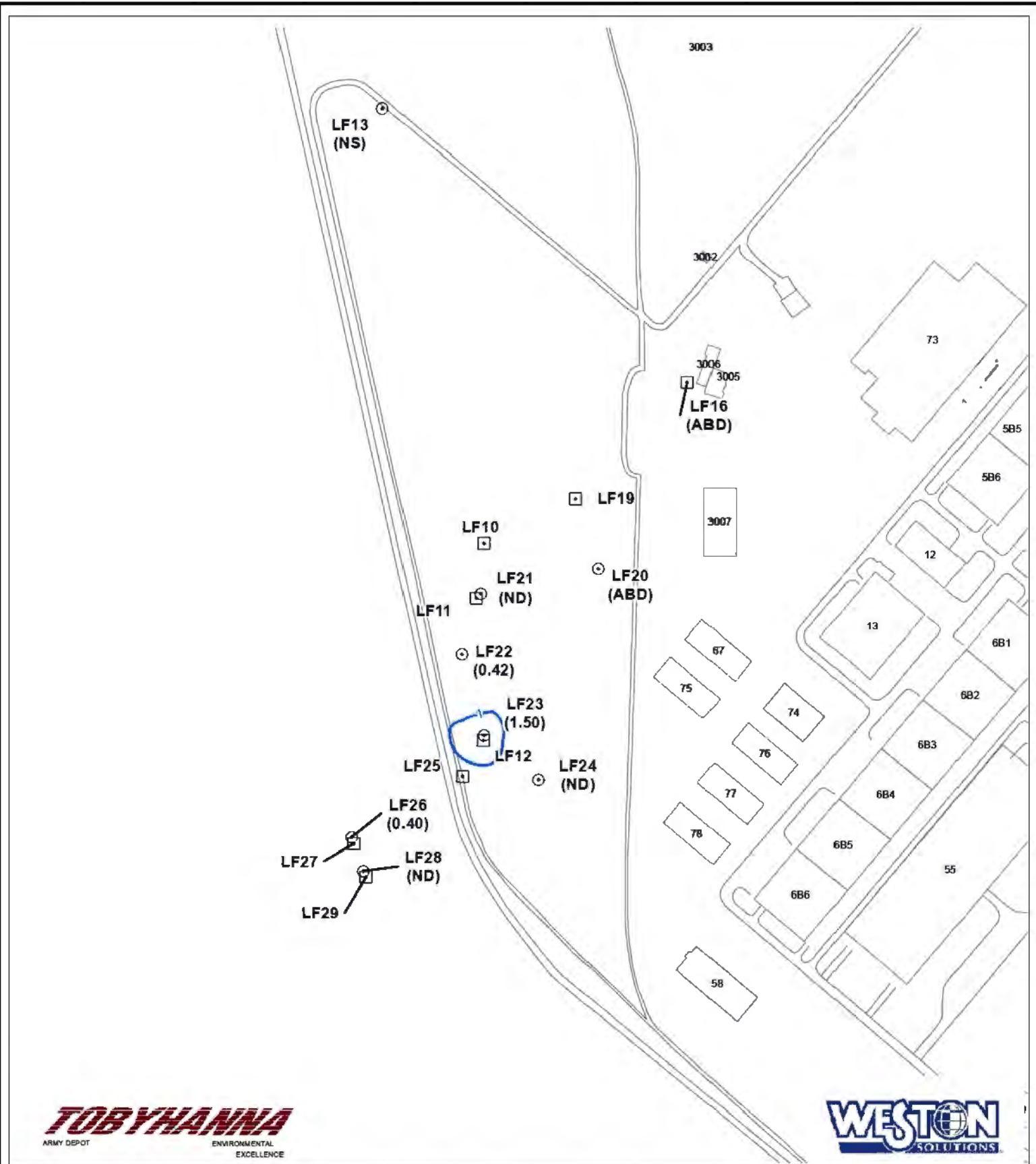
Legend:

- 1 — Contaminant Plume (in parts per billion)
- Approximate Location of Bedrock Monitoring Well
- ⊙ Approximate Location of Glacial Till Monitoring Well
- ND Compound Not Detected
- NS Not Sampled



Appendix D-13

Vinyl Chloride Concentration
Contour, Glacial Till Aquifer
30 April - 16 May 2007



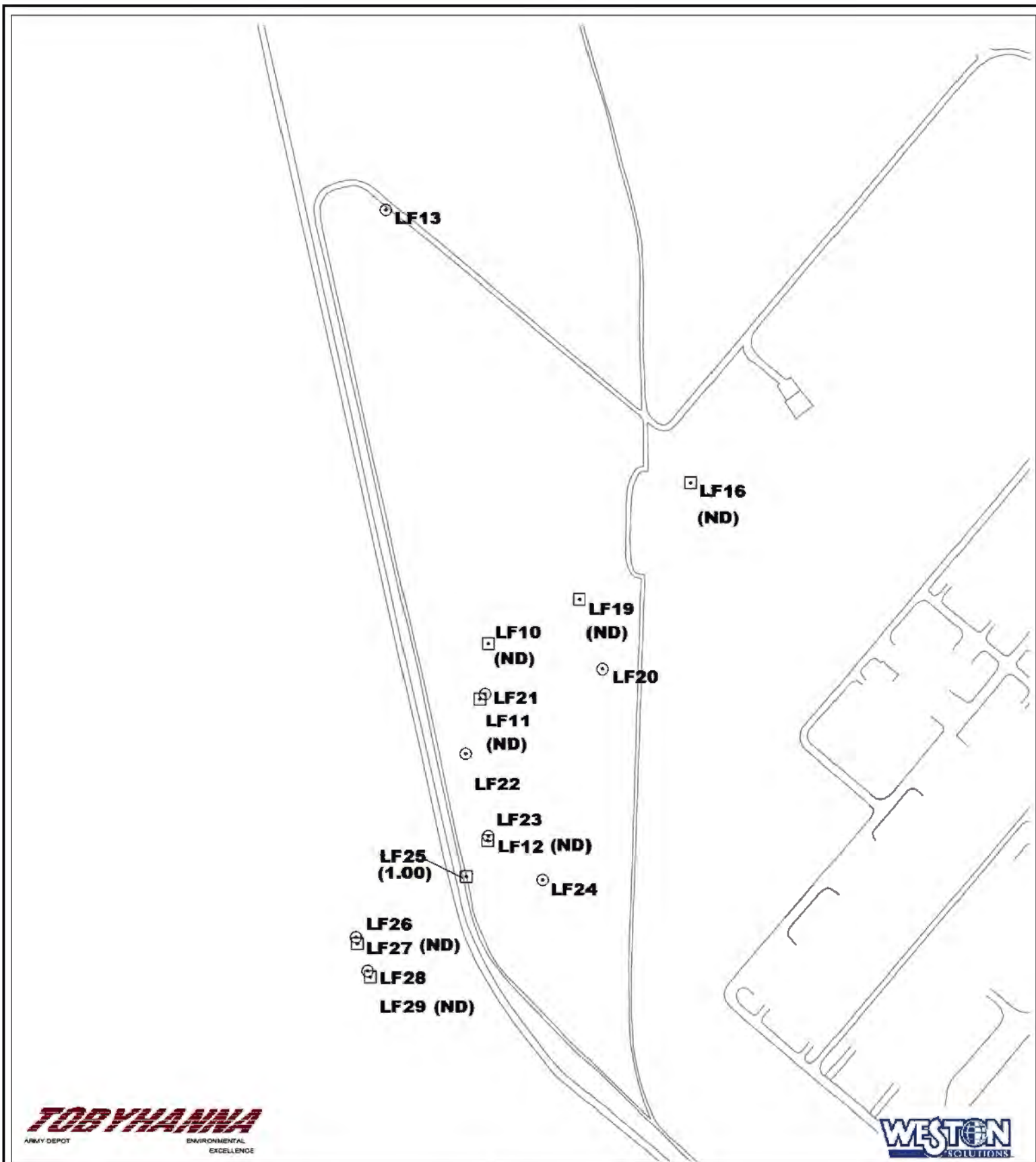
Legend:

| | | | |
|--------------------------------------|---|-----------|--------------------------|
| | Contaminant Plume (in parts per billion) | ND | Compound Not Detected |
| | Approximate Location of Bedrock Monitoring Well | NS | Not Sampled |
| | Approximate Location of Glacial Till Monitoring Well | | |
| ABD Abandoned - November 2006 | | | |



Appendix D-14

Vinyl Chloride Concentration
Contour, Glacial Till Aquifer
November 2011

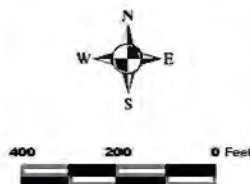


TOBYHANNA
ARMY DEPOT ENVIRONMENTAL EXCELLENCE

WESTON
SOLUTIONS

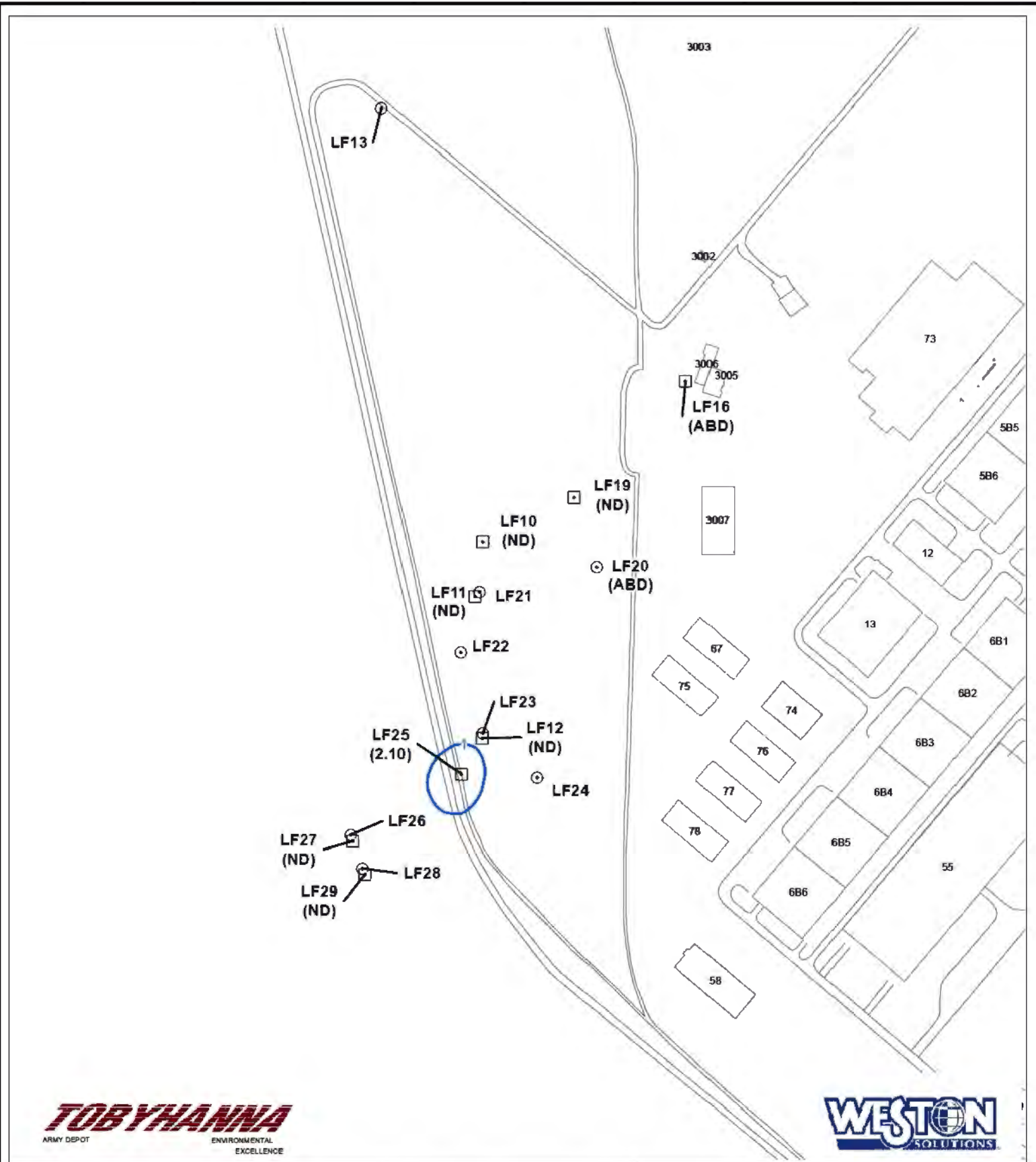
Legend:

- | | | | |
|---|--|----|-----------------------|
| □ | Approximate Location of Bedrock Monitoring Well | ND | Compound Not Detected |
| ⊙ | Approximate Location of Glacial Till Monitoring Well | NS | Not Sampled |

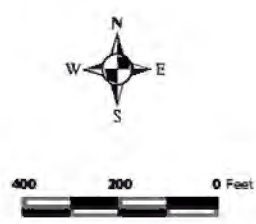


Appendix D-15

Vinyl Chloride Concentration
Contour, Bedrock Aquifer
30 April - 16 May 2007



| | | |
|--------------------------------------|---|------------------------------------|
| Legend: | | |
| | Contaminant Plume (in parts per billion) | |
| | Approximate Location of Bedrock Monitoring Well | ND Compound Not Detected |
| | Approximate Location of Glacial Till Monitoring Well | NS Not Sampled |
| ABD Abandoned - November 2006 | | |



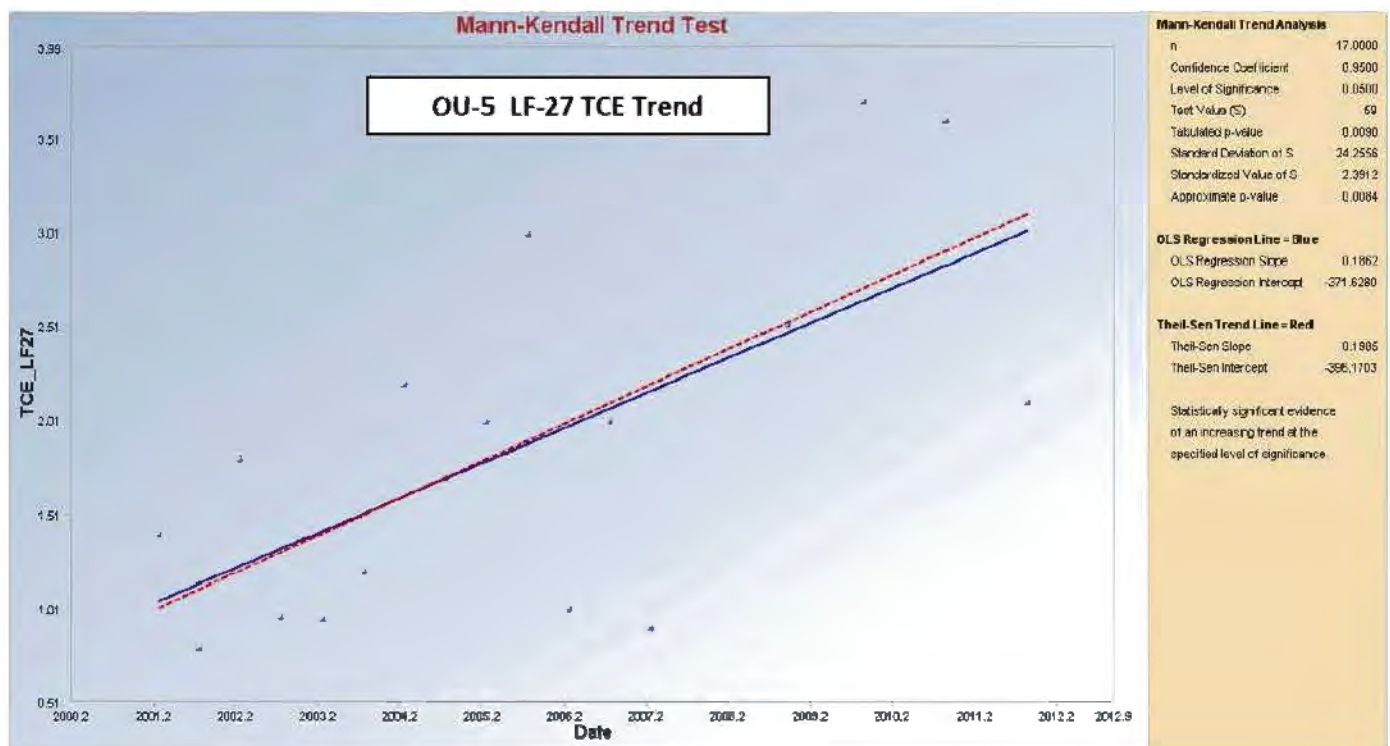
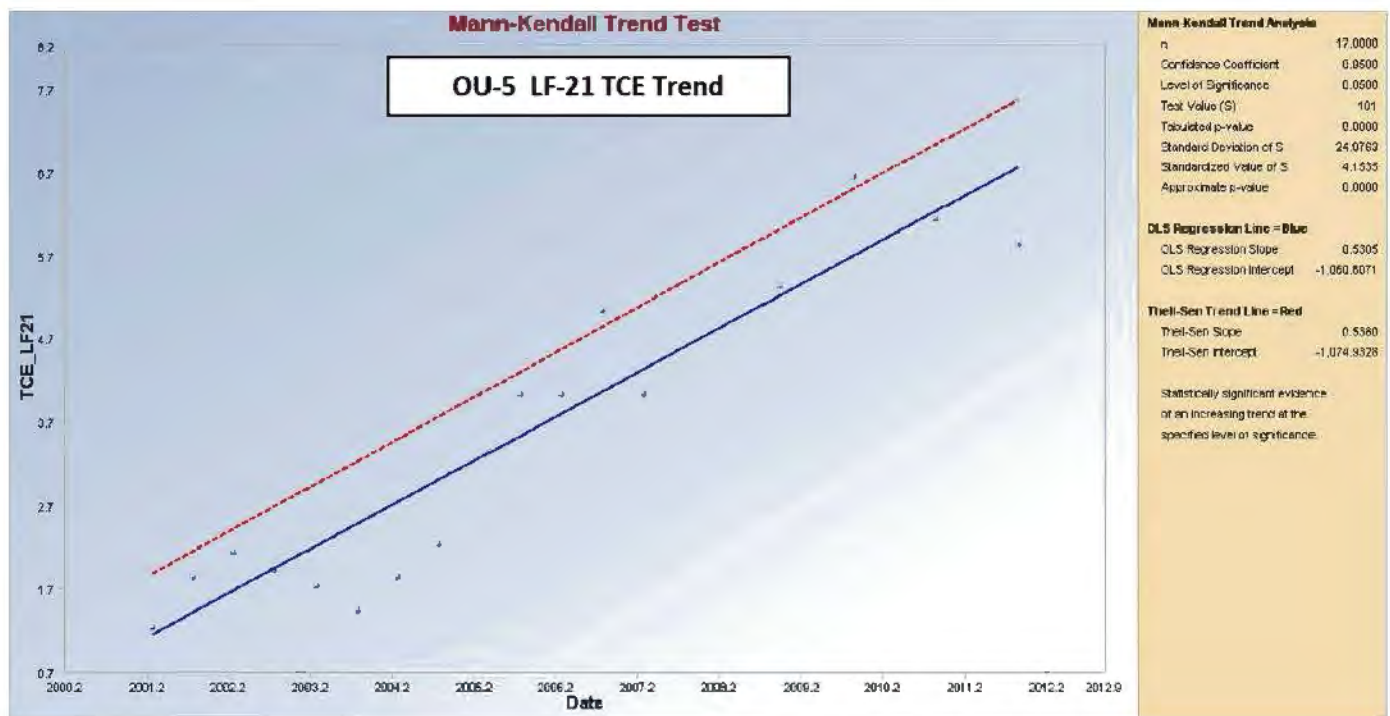
Appendix D-16

Vinyl Chloride Concentration
Contour, Bedrock Aquifer
November 2011

FINAL

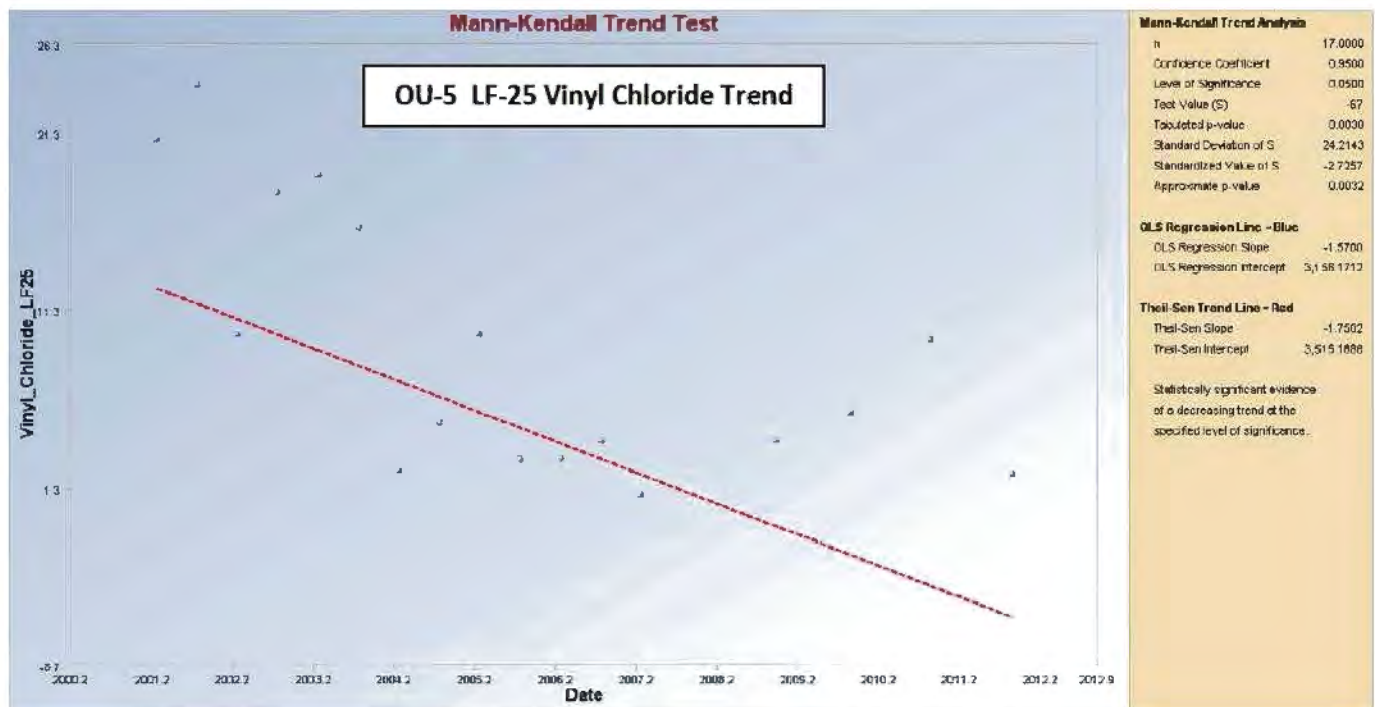
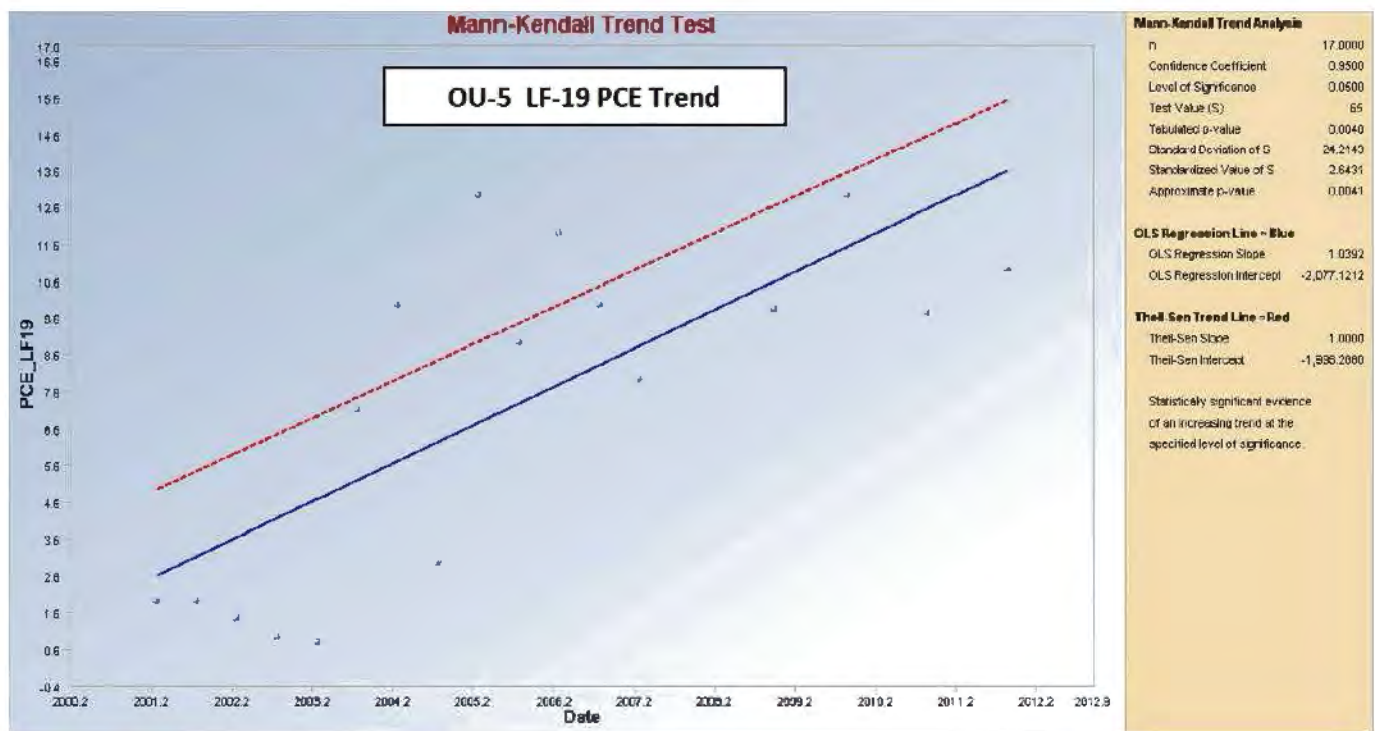
OU-5 MANN-KENDALL RESULTS

Appendix D-17 **TYAD Operable Unit 5 – Mann Kendall Trend Graphs**

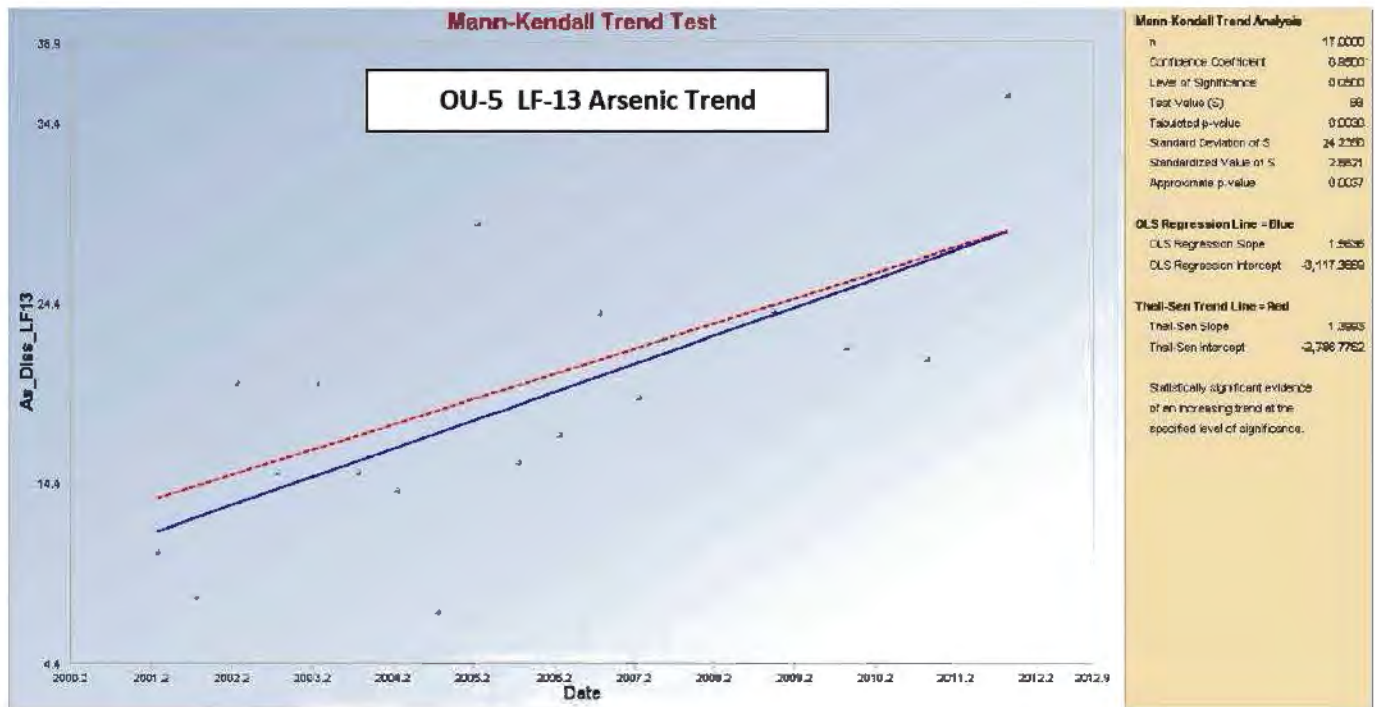


Appendix D-17

TYAD Operable Unit 5 – Mann Kendall Trend Graphs



Appendix D-17 TYAD Operable Unit 5 – Mann Kendall Trend Graphs



FINAL

**OU-5 LFWSP MONITORING WELL CONTAMINANT STATUS
2000-2011**

APPENDIX D-18
LFWSP MONITORING WELL CONTAMINANT STATUS
TOBYHANNA ARMY DEPOT

| WELL ID | Aquifer | Feb-00 | Oct-00 | Apr-01 | Oct-01 | Apr-02 | Oct-02 | Apr-03 | Oct-03 | Apr-04 | Oct-04 | Apr-05 | Oct-05 | Apr-06 | Oct-06 | Apr-07 | Dec-08 | Nov-09 | Nov-10 | Nov-11 |
|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| LF01 | BR | Hits | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| LF10 | BR | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits |
| LF11 | BR | Hits | Hits | BMCL | BMCL | Hits | BMCL | BMCL | BMCL | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits |
| LF12 | BR | Hits | Hits | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | Hits | Hits | Hits | BMCL | Hits | BMCL | Hits | Hits | Hits | Hits |
| LF13 | GT | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits |
| LF16 | BR | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | NS | NS | NS | NS | NS | NS |
| LF19 | BR | BMCL | BMCL | BMCL | BMCL | BMCL | NS | BMCL | Hits | Hits | BMCL | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits |
| LF20 | GT | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| LF21 | GT | Hits | Hits | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | BMCL | Hits | Hits | Hits | Hits |
| LF22 | GT | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | BMCL | BMCL | Hits | Hits |
| LF23 | GT | Hits | Hits | Hits | BMCL | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits |
| LF24 | GT | NS | NS | NS | BMCL | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL |
| LF25 | BR | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | Hits | BMCL | Hits | Hits | Hits | Hits |
| LF26 | GT | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL |
| LF27 | BR | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | Hits | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL |
| LF28 | GT | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL |
| LF29 | BR | NS | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL | BMCL |

Notes:

COPCs - Contaminants of potential concern include: barium, arsenic, benzene, vinyl chloride, PCE, TCE, 1,2-dichloropropane, pentachlorophenol, bis(2-ethylhexyl)phthalate.

BR - Bedrock aquifer.

GT - Glacial till (overburden) aquifer.

Hits - One or more of the COPCs were detected at levels above the associated MCL(s).

NS - None of the COPCs were detected at any level in the associated sample.

BMCL - None of the COPCs were detected at levels above the associated MCL.

(One or more of the COPCs may have been detected, but not at levels above the associated MCL.)

NS - Well not sampled during specified round.

APPENDIX E

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST AND PHOTOS



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

May 8, 2012

Mr. Jaroslav Sebek
Installation Restoration Project Manager
Department of the Army
Tobyhanna Army Depot (AMSEL-TY-RK-E)
11 Hap Arnold Boulevard
Tobyhanna, PA 18466-5086

Dear Mr. Sebek:

On March 22, 2012, EPA Remedial Project Manager (RPM) Lorie Baker met with Depot, Pennsylvania Department of Environmental Protection (PADEP), and USACE personnel to conduct a five-year review site inspection of the Tobyhanna Army Depot (TYAD). The last five-year review accomplished at this construction-complete NPL site took place in September 2007. Because this site contains multiple OUs, this five-year review will include OU1 (Areas A and B), OU4 (UXO Area), and OU5 (Inactive Landfill).

The OU1 and OU5 units are groundwater sites with natural attenuation/institutional controls/long-term monitoring as the remedy. The concentration and the size of the contaminant plumes continue to decrease over time as predicted. As a result, the biannual sampling of monitoring and residential wells had been cut back to annual sampling in 2007. The OU4 ROD for the UXO area specified institutional controls as the remedy. All institutional controls are in place and appear to be functioning adequately. Additional acreage in OU4 was cleared during this reporting period for the construction of additional radar testing equipment on top of Powder Smoke Ridge.

During this 5-year review cycle, TYAD conducted a vapor intrusion (VI) investigation in the area of the offsite plume associated with OU1. The results of this investigation are to be included in the final five-year review report. Based on preliminary results of the VI investigation, and based on our site inspection of March 22, 2012, there does not appear to be any indicators of potential remedy issues that would interfere with the protectiveness of any of the remedies for the three OUs subject to this review.

Sincerely,

A handwritten signature in black ink, which appears to read "Lorie Baker", is positioned above the printed name.

Lorie Baker
Remedial Project Manager

Attachment: Five-Year Review Site Inspection Checklist

cc: Robert Lewis (PADEP)



Site Inspection Checklist

| I. SITE INFORMATION | |
|--|--|
| Site name: Tobyhanna Army Depot | Date of inspection 3/22/2012 |
| Location and Region: Monroe County, PA Reg. III | EPA ID: PA5213820892 |
| Agency, office, or company leading the five-year review: DOD | Weather/temperature: Sunny, 70s |
| Remedy Includes: (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;"> <input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ </div> <div style="width: 45%;"> <input checked="" type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls </div> </div> | |
| Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached | |
| II. INTERVIEWS (Check all that apply) | |
| 1. O&M site manager <u>Michael Parrent</u> <u>HMIR Program Manager</u> <u>3/22/2012</u> | |
| <div style="display: flex; justify-content: space-between; margin-bottom: 5px;"> Name Title Date </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. <u>570-615-6105</u> Problems, suggestions; <input type="checkbox"/> Report attached _____ _____ | |
| 2. O&M staff <u>Jaroslav Sebek</u> <u>Project Manager</u> <u>3/22/2012</u> | |
| <div style="display: flex; justify-content: space-between; margin-bottom: 5px;"> Name Title Date </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. <u>570-615-8452</u> Problems, suggestions; <input type="checkbox"/> Report attached _____ _____ | |

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency PA Dept. of Environmental Protection

Contact Robert Lewis Env. Group Manager 3/22/2012 570-826-2360
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency PA Dept. of Environmental Protection

Contact Will Craft Hydrogeologist 3/22/2012 570-826-2360
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency US Corps of Engineers

Contact James Bynam Project Manager 3/22/2012 _____
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

Agency _____

Contact _____
Name Title Date Phone no.

Problems; suggestions; ☐ Report attached _____

4. **Other interviews (optional)** ☐ Report attached.

Chris Moran, Weston, Inc. Contractor for Tobyhanna Army Depot

| III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply) | | | | |
|--|---|---|---|---|
| 1. | O&M Documents <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____ | <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input type="checkbox"/> N/A |
| 2. | Site-Specific Health and Safety Plan <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____ | <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A <input type="checkbox"/> N/A |
| 3. | O&M and OSHA Training Records Remarks _____ | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| 4. | Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits <u>Service Agreement</u> Remarks <u>TYAD Agreement with Private residents who have hooked up to TYAD water supply</u> | <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available | <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input type="checkbox"/> N/A |
| 5. | Gas Generation Records Remarks _____ | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| 6. | Settlement Monument Records Remarks _____ | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| 7. | Groundwater Monitoring Records Remarks _____ | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |
| 8. | Leachate Extraction Records Remarks _____ | <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A |
| 9. | Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____ | <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available | <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date | <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A |
| 10. | Daily Access/Security Logs Remarks _____ | <input checked="" type="checkbox"/> Readily available | <input checked="" type="checkbox"/> Up to date | <input type="checkbox"/> N/A |

| IV. O&M COSTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---------------------|--|-------------------|----------------|------------------|--|------|------|------------|--|-------------------|----------------|------------------|--|------|------|------------|--|-------------------|----------------|------------------|--|------|------|------------|--|-------------------|----------------|---------------------|--|------|------|------------|--|-------------------|----------------|-----------------|--|------|------|------------|--|
| 1. | O&M Organization <input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Contractor for Federal Facility <input checked="" type="checkbox"/> Other <u>US Army Corps of Engineers</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. | O&M Cost Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate <u>\$119,500</u> <input type="checkbox"/> Breakdown attached <div style="text-align: center;">Total annual cost by year for review period if available</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From <u>10/10</u></td> <td style="width: 20%;">To <u>9/11</u></td> <td style="width: 20%; text-align: right;"><u>\$103,958</u></td> <td style="width: 40%;"><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From <u>10/09</u></td> <td>To <u>9/10</u></td> <td style="text-align: right;"><u>\$ 91,665</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From <u>10/08</u></td> <td>To <u>9/09</u></td> <td style="text-align: right;"><u>\$108,334</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From <u>10/07</u></td> <td>To <u>9/08</u></td> <td style="text-align: right;"><u>\$116,664.70</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From <u>10/06</u></td> <td>To <u>9/07</u></td> <td style="text-align: right;"><u>\$78,854</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> </table> | | | From <u>10/10</u> | To <u>9/11</u> | <u>\$103,958</u> | <input checked="" type="checkbox"/> Breakdown attached | Date | Date | Total cost | | From <u>10/09</u> | To <u>9/10</u> | <u>\$ 91,665</u> | <input checked="" type="checkbox"/> Breakdown attached | Date | Date | Total cost | | From <u>10/08</u> | To <u>9/09</u> | <u>\$108,334</u> | <input checked="" type="checkbox"/> Breakdown attached | Date | Date | Total cost | | From <u>10/07</u> | To <u>9/08</u> | <u>\$116,664.70</u> | <input checked="" type="checkbox"/> Breakdown attached | Date | Date | Total cost | | From <u>10/06</u> | To <u>9/07</u> | <u>\$78,854</u> | <input checked="" type="checkbox"/> Breakdown attached | Date | Date | Total cost | |
| From <u>10/10</u> | To <u>9/11</u> | <u>\$103,958</u> | <input checked="" type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date | Date | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From <u>10/09</u> | To <u>9/10</u> | <u>\$ 91,665</u> | <input checked="" type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date | Date | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From <u>10/08</u> | To <u>9/09</u> | <u>\$108,334</u> | <input checked="" type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date | Date | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From <u>10/07</u> | To <u>9/08</u> | <u>\$116,664.70</u> | <input checked="" type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date | Date | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| From <u>10/06</u> | To <u>9/07</u> | <u>\$78,854</u> | <input checked="" type="checkbox"/> Breakdown attached | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date | Date | Total cost | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. | Unanticipated or Unusually High O&M Costs During Review Period Describe costs and reasons: <u>No unanticipated or unusually high O&M costs during review period.</u> <u>Most costs associated with sampling and report preparation.</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A. Fencing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. | Fencing damaged <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>Fencing was not damaged during site inspection on 3/22/12. Fence is inspected periodically throughout the year and repairs are made when necessary.</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B. Other Access Restrictions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. | Signs and other security measures <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks <u>Signs are in place and visible around fencing in OU-4, the UXO area. Signs have been replaced on an as necessary basis mainly due to theft.</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

C. Institutional Controls (ICs)**1. Implementation and enforcement**

Site conditions imply ICs not properly implemented

☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced

☐ Yes ☒ No ☐ N/AType of monitoring (e.g., self-reporting, drive by) Drive-byFrequency Monthly drive by – environmental; Daily drive by - securityResponsible party/agency Tobyhanna Army DepotContact Jaroslav Sebek Env. Project manager 3/22/2012 570-615-8452

Name

Title

Date

Phone no.

Reporting is up-to-date

☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency

☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met

☒ Yes ☐ No ☐ N/A

Violations have been reported

☒ Yes ☐ No ☐ N/AOther problems or suggestions: ☐ Report attached

An antenna was set up on OU-5 on top of the landfill cover without notification to the Environmental Management Division. Once EMD learned of the antenna, they had the antenna taken down and the boreholes that were dug for the supports were filled and sealed with bentonite.

2. Adequacy☒ ICs are adequate☐ ICs are inadequate☐ N/A

Remarks Zoning officials have called TYAD when someone is buying an existing house on the waterline or when someone plans to build a new house in the plume area. Also, security has reported no trespassing in the UXO area

D. General**1. Vandalism/trespassing**☐ Location shown on site map☐ No vandalism evidentRemarks Signs posted along the fencing for UXO area have been sporadically taken.**2. Land use changes on site** ☐ N/A

Remarks Beginning in 2008, TYAD constructed 2 radar test sites within OU-4. This required ordnance clearance to 2 feet of 8 acres of land, and 24 additional acres cleared of surface MEC/debris for vegetation removal. Also two new building were built near Area A which is part of OU1. Since this area overlies the VOC plume, a vapor barrier was constructed for both buildings.

3. Land use changes off site ☒ N/ARemarks A house was built offsite within the plume area and connected to the TYAD water supply.**VI. GENERAL SITE CONDITIONS****A. Roads**☐ Applicable☒ N/A**1. Roads damaged**☐ Location shown on site map☐ Roads adequate☒ N/A

Remarks _____

| | | |
|---|---|---|
| B. Other Site Conditions | | |
| Remarks _____ _____ _____ _____ _____ | | |
| VII. LANDFILL COVERS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| A. Landfill Surface | | |
| 1. | Settlement (Low spots) Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident _____ |
| 2. | Cracks Lengths _____ Widths _____ Depths _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Cracking not evident _____ |
| 3. | Erosion Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident _____ |
| 4. | Holes Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident _____ |
| 5. | Vegetative Cover <input checked="" type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks <u>There are some small shrubs located on the landfill cover but grass is kept cut during the summer months and shrubs will be cut down.</u> | |
| 6. | Alternative Cover (armored rock, concrete, etc.) <input checked="" type="checkbox"/> N/A Remarks _____ | |
| 7. | Bulges Areal extent _____ Height _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident _____ |
| 8. | Wet Areas/Water Damage <input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Wet areas <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Ponding <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Seeps <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Soft subgrade <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ | |

| | | | |
|--|---|--|--|
| 9. | Slope Instability Areal extent _____ Remarks _____ | <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability | |
| B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.) | | | |
| 1. | Flows Bypass Bench Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay | |
| 2. | Bench Breached Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay | |
| 3. | Bench Overtopped Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay | |
| C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.) | | | |
| 1. | Settlement Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of settlement | |
| 2. | Material Degradation Material type _____ Areal extent _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of degradation | |
| 3. | Erosion Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of erosion | |

| | | | |
|--|--|--|--|
| 4. | Undercutting Areal extent _____ Depth _____ Remarks _____ | <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of undercutting | |
| 5. | Obstructions Type _____ <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____ | <input checked="" type="checkbox"/> No obstructions | |
| 6. | Excessive Vegetative Growth Type _____ <input checked="" type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ | | |
| D. Cover Penetrations <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | | |
| 1. | Gas Vents <input type="checkbox"/> Active <input checked="" type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | | |
| 2. | Gas Monitoring Probes <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | | |
| 3. | Monitoring Wells (within surface area of landfill) <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | | |
| 4. | Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks _____ | | |
| 5. | Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A Remarks _____ | | |

| | | | | |
|---|--|--|-------------------------------------|---|
| E. Gas Collection and Treatment | | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. | Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 2. | Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ | | | |
| 3. | Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| F. Cover Drainage Layer | | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. | Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 2. | Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| G. Detention/Sedimentation Ponds | | | <input type="checkbox"/> Applicable | <input checked="" type="checkbox"/> N/A |
| 1. | Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____ | | | |
| 2. | Erosion Areal extent _____ Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____ | | | |
| 3. | Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |
| 4. | Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____ | | | |

| | | |
|--|---|--|
| H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. | Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ | |
| 2. | Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Degradation not evident Remarks _____ | |
| I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A | | |
| 1. | Siltation <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident Areal extent _____ Depth _____ Remarks <u>Stormwater drainage through landfill to offsite-permitted outfalls</u> | |
| 2. | Vegetative Growth <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Vegetation does not impede flow Areal extent _____ Type _____ Remarks _____ | |
| 3. | Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ | |
| 4. | Discharge Structure <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ | |
| VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A | | |
| 1. | Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____ | |
| 2. | Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____ | |


| | | | |
|----------------------------|---|--|------------------------------|
| C. Treatment System | | <input checked="" type="checkbox"/> Applicable | <input type="checkbox"/> N/A |
| 1. | Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input checked="" type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> Sampling ports properly marked and functional <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <input checked="" type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually <u>15 million gallons</u> <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ | | |
| 2. | Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | |
| 3. | Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ | | |
| 4. | Discharge Structure and Appurtenances <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ | | |
| 5. | Treatment Building(s) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ | | |
| 6. | Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks _____ | | |
| D. Monitoring Data | | | |
| 1. | Monitoring Data <input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality | | |
| 2. | Monitoring data suggests: <input checked="" type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining | | |


| | | | |
|--|---|--|--|
| D. Monitored Natural Attenuation | | | |
| 1. | Monitoring Wells (natural attenuation remedy) <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ | | |
| X. OTHER REMEDIES | | | |
| If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. | | | |
| XI. OVERALL OBSERVATIONS | | | |
| A. Implementation of the Remedy | | | |
| Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <u>Purpose of remedy for OU1 and OU5 is natural attenuation of contaminant plume. Based on data from semi-annual sampling, concentrations of VOCs in plume is decreasing since the remedy was in place. Now that levels of VOCs are low, concentrations seem to be leveling out. Remedy for OU-4, the UXO area is institutional controls. Fencing and signs are in place and are maintained on a yearly or as necessary basis.</u> | | | |
| B. Adequacy of O&M | | | |
| Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>O&M is adequate. Fencing for OU-4 is in good shape. However, there is one section of fencing that abuts a public roadway. It is possible that trespassers/hunters could cross the fence which is 5 strands of barbed wire. TYAD will look into potentially redesigning the fence in this area to ensure that no one can enter the property.</u> | | | |

| | |
|---|--|
| C. | Early Indicators of Potential Remedy Problems |
| <p>Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>No issues to indicate potential remedy problems.</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> | |
| D. | Opportunities for Optimization |
| <p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u>TYAD will review monitoring system to determine whether any wells could be dropped from the annual sampling to reduce O&M costs.</u></p> | |

Appendix E-2
Tobyhanna Army Depot, Tobyhanna, Pennsylvania (TYAD)
5-Year Review Photographic Record


| | |
|--|--|
| CLIENT: U.S. Army Corps of Engineers, Baltimore District | PROJECT #: 03886.550.030.5000 |
| SITE NAME: TYAD | SITE LOCATION: Tobyhanna, Pennsylvania |


| | |
|---|---|
| PHOTOGRAPH: _0081 |  |
| PHOTOGRAPHER: | |
| DATE: 3/22/2012 | |
| DIRECTION: | |
| COMMENTS: Photos taken for site inspection. Photo showing the condition of the Northern OU-4 UXO boundary fence. | |

| | |
|---|--|
| PHOTOGRAPH: _0082 |  |
| PHOTOGRAPHER: | |
| DATE: 3/22/2012 | |
| DIRECTION: | |
| COMMENTS: Photo showing the condition of monitoring wells in Area A (MW-01) | |


Appendix E-2
Tobyhanna Army Depot, Tobyhanna, Pennsylvania (TYAD)
5-Year Review Photographic Record

| | |
|--|--|
| CLIENT: U.S. Army Corps of Engineers, Baltimore District | PROJECT #: 03886.550.030.5000 |
| SITE NAME: TYAD | SITE LOCATION: Tobyhanna, Pennsylvania |

| | |
|--|---|
| PHOTOGRAPH: _0087 |  |
| PHOTOGRAPHER: | |
| DATE: 3/22/2012 | |
| DIRECTION: | |
| COMMENTS: Photo showing the condition of the Landfill 5 Cap, Cell B. | |

| | |
|---|--|
| PHOTOGRAPH: _0088 |  |
| PHOTOGRAPHER: | |
| DATE: 3/22/2012 | |
| DIRECTION: | |
| COMMENTS: Photo showing the condition of monitoring wells in OU-5 (LF-22) | |

**Appendix E-2
Tobyhanna Army Depot, Tobyhanna, Pennsylvania (TYAD)
5-Year Review Photographic Record**

| | | | |
|--|--|---|--|
| CLIENT: U.S. Army Corps of Engineers, Baltimore District | | PROJECT #: 03886.550.030.5000 | |
| SITE NAME: TYAD | | SITE LOCATION: Tobyhanna, Pennsylvania | |
| PHOTOGRAPH: _0091 | |  | |
| PHOTOGRAPHER: | | | |
| DATE: 3/22/2012 | | | |
| DIRECTION: | | | |
| COMMENTS: Photo showing the condition of landfill 5 cap, Cell A viewed from cell B | | | |

FINAL

APPENDIX F

PUBLIC INVOLVEMENT

FINAL

SITE INTERVIEWS

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Community Interview

Time:

Date: 13 June 2012

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Mike Parrent/Jaro Sebek

Title: Environmental

Organization: ELTY-RKE

Individual Contacted:

Doreen Vashlishan

Title: Residents

Organization:

Telephone:

Street Address: 55 Main St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

1. What is your overall impression of the project? (general sentiment)

Tobyhanna Army Depot is doing a good job.

2. What effects have site operations had on the surrounding community?

The effects are minimal. Testing doesn't interfere with day to day life.

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No.

4. Do you feel well informed about the site's activities and progress?

Yes.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

No.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Vapor Intrusion Sampling

Time: 14:00 pm

Date: 14 June 2012

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jaroslav Sebek

Title: Environmental Engineer

Organization: ELTY-RKE

Individual Contacted:

Merton Quick

Title: Resident

Organization:

Telephone:

Street Address: 33 Maple St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

1. What is your overall impression of the project? (general sentiment)

Merton expressed that Tobyhanna Army Depot has been trying to do what is right, and in most aspects have done what they can do.

2. What effects have site operations had on the surrounding community?

Merton stated that as Tobyhanna Army Depot has become aware of different problems they worked to correct the situations and in time they did correct the situations. The resident felt good that Tobyhanna Army Depot was monitoring the ground water. The resident felt informed and that the problems aren't being overlooked.

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

No.

4. Do you feel well informed about the site's activities and progress?

Merton said he was informed about the Installation Restoration Program, but that he is concerned about the retention pond and does not feel informed about what is going on to fix it.

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Merton said that Tobyhanna Army Depot Command has been unresponsive for 20 years to fix the retention pond.

NOTIFICATION RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Annual consumer confidence drinking water report

Type: ☐ Telephone ☐ Visit ☒ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Notification sent out by:

Name: Tom Wildoner

Title: Environmental Specialist

Organization: ELTY-RKE

Dates:

The consumer confidence drinking water report is sent out in June every year.

Individuals Contacted:

All the residents who receive water from Tobyhanna Army Depot Report

Mrs. Esther Alonis
Norman Gifford
Mrs. Joseph Kovich
Ms. Kathy Kleibert
Herbert Kuebler
Mr and Mrs. James O'Neill
Merton Quick
Patricia Senerchia
Mr and Mrs. Robert Tambasco
Ms. Doreen Vashlishan
Mrs. Richard Walter
Stanley Kolodzey

Summary of Communication

The Consumer Confidence Report, or CCR, is an annual report required by all community water suppliers. The CCR is mailed to all off-post residents in June of each year. The CCR summarizes the sample results of the potable water provided by Tobyhanna Army Depot. The sample results summarized in the CCR are from the previous year that the report is issued.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Soil Vapor Sampling

Time: 7:00 pm

Date: 15 Dec 2009

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Coolbaugh Township Bldg

Contact Made By:

Name: Michael Parrent

Title: Chemist

Organization: ELTY-RKE

Individual Contacted:

Title: Township supervisors

Organization:

Telephone:

Street Address:

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

The history of the Tobyhanna Army Depot site was discussed and a plan of action presented to the township supervisors along with an explanation of the need for their support to complete the sampling necessary to eliminate the possibility (or document the presence) of any soil vapors intruding into the homes nearest MW-23. The supervisors supported the plan and promised to write a letter of support.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Soil Vapor Sampling Meeting

Time: 1:00 pm

Date: 9 Feb 2010

Type: ☐ Telephone ☐ Visit ☒ Other

☐ Incoming ☒ Outgoing

Location of visit: Pocono Room

Contact Made By:

Name: Michael Parrent

Title: Chemist

Organization: ELTY-RKE

Individual Contacted:

see below

Title: Residents

Organization:

Telephone:

Street Address:

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Residents attending include:

Mr. and Mrs. Merton Quick

Mr. Richard Walter

Mr. James O'Neill

The history of the site was discussed and a plan of action presented to the residents, along with an explanation of the need for their cooperation to complete the sampling necessary to eliminate the possibility (or document the presence) of any soil vapors intruding into the homes. Residents were appreciative and pledged their cooperation.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Soil Vapor Sampling Notification

Time:

Date: 3 Mar 2011

Type: ☐ Telephone ☐ Visit ☒ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Michael Parrent

Title: Chemist

Organization: ELTY-RKE

Individual Contacted:

see below

Title: Residents

Organization:

Telephone:

Street Address:

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

A letter announcing the imminent (week of 21 Mar 2011) sampling of soil vapors was sent to the following residents:

Mr. and Mrs. Merton Quick
Mr. Richard Walter
Ms. Doreen Vashlishan
Mr. and Mrs. Robert Tambasco

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Vapor Intrusion Sampling

Time: 10:00 pm

Date: 8 Dec 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jaroslav Sebek

Title: Environmental Engineer

Organization: ELTY-RKE

Individual Contacted:

Merton Quick

Title: Resident

Organization:

Telephone:

Street Address: 33 Maple St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Discussed vapor intrusion sampling issues at time that the fall sampling occurred. Discussed the chemicals that were removed from the basement on 7 Dec 2011 that might have affected the sample. Explained that the chemicals that were removed should not be brought back into the house while the sampling was being conducted. Explained that dry cleaning should not be brought into the house while the sampling was being conducted. Discussed the level of water that was in the soil under the basement. The resident explained that water had been coming up through the basement but that the sump pumps in the basement were working. The resident was concerned about a sump pump that is located outside of the house is not working. Discussed that since the water levels are so high the sub surface vapor intrusion sample will not be collected. The resident was satisfied with just having indoor air samples taken. The resident was satisfied with the vapor intrusion investigation.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:30 pm

Date: 30 Sep 2010

Type: ☒ Telephone ☒ Visit ☐ Other

☒ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Mike Parrent/Jaro Sebek

Title: Environmental

Organization: ELTY-RKE

Individual Contacted:

Merton Quick

Title: Resident

Organization:

Telephone: _____

Street Address: 33 Maple St.

Fax No: _____

City State, Zip: Tobyhanna, PA 18466

E-Mail: _____

Summary of Conversation

Merton Quick called to complain about storm water running off the depot to his property. He was concerned about the water standing on the property that he was attempting to sell. Mike Parrent and Jaro Sebek visited the site and took photographs. It appeared that the storm water retention basion on that part of the depot was not functioning adequately. Merton Quick stopped to talk as he was returning home and requested something be done. As a result of his complaints, a study of the problem was completed to determine what would be necessary to repair the retention pond so that it would function as designed and a work order put in to the Directorate of Public Works to remove 400 CY of soil that had collected in the basin over the years.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Ms. Doreen Vashlishan

Title: Resident

Organization:

Telephone: _____

Street Address: 55 Main St.

Fax No: _____

City State, Zip: Tobyhanna, PA 18466

E-Mail: _____

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Mrs. Esther Alonis

Title: Resident

Organization:

Telephone:

Street Address: Main St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Herbert Kuebler

Title: Owner

Organization:
Kuebler's Mountain Resort

Telephone: _____

Street Address: Main St.

Fax No: _____

City State, Zip: Tobyhanna, PA 18466

E-Mail: _____

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Mrs. Joseph Kovich

Title: Resident

Organization:

Telephone:

Street Address: Main St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Mr and Mrs. James O'Neill

Title: Resident

Organization:

Telephone: _____

Mailing Address: P.O. Box 615

Fax No: _____

City State, Zip: Tobyhanna, PA 18466

E-Mail: _____

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Ms. Kathy Kleibert

Title: Owner

Organization: Black Horse Pub & Tavern

Telephone: _____

Street Address: 22 Birch St.

Fax No: _____

City State, Zip: Tobyhanna, PA 18466

E-Mail: _____

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:30 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Merton Quick

Title: Resident

Organization:

Telephone:

Street Address: 33 Maple St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Norman Gifford

Title: Resident

Organization:

Telephone:

Street Address: Main St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 2:30 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Patricia Senerchia

Title: Resident

Organization:

Telephone:

Street Address: 52 Main St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Mr and Mrs. Robert Tambasco

Title: Resident

Organization:

Telephone:

Street Address: 62 Main St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Mrs. Richard Walter

Title: Resident

Organization:

Telephone: _____

Street Address: RD 1 Box 194, Maple St.

Fax No: _____

City State, Zip: Tobyhanna, PA 18466

E-Mail: _____

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

INTERVIEW RECORD

Site Name: Tobyhanna Army Depot

EPA ID No: PA5213820892

Subject: Boil Water Advisory

Time: 3:40 pm

Date: 10 Jan 2011

Type: ☐ Telephone ☒ Visit ☐ Other

☐ Incoming ☒ Outgoing

Location of visit: Home

Contact Made By:

Name: Jeffrey Beehler

Title: Environmental Intern

Organization: ELTY-RKE

Individual Contacted:

Stanley Kolodzey

Title: Resident

Organization:

Telephone:

Street Address: Main St.

Fax No:

City State, Zip: Tobyhanna, PA 18466

E-Mail:

Summary of Conversation

Advised resident, whose home is supplied water from Tobyhanna Army Depot, to boil water before drinking, due to a sample that came back positive for e. coli bacteria. Also advised resident that check samples have been taken and system wide inspections are underway. Returned on 13 Jan 2011 to report that the check sample was clear and the boil advisory was ended.

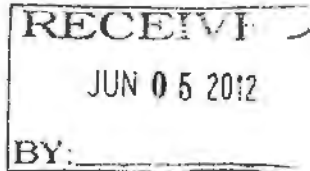
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PROOF OF PUBLICATION

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Commonwealth of Pennsylvania, County of Lackawanna

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Gina Krushinski

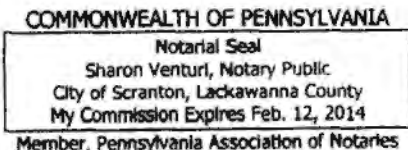
Being duly sworn according to law deposes and says that she is Billing clerk for The Scranton Times, owner and publisher of The Scranton Times, a newspaper of general circulation, established in 1870, published in the city of Scranton, county and state aforesaid, and that the printed notice or publication hereto attached is exactly as printed in the regular editions of the said newspaper on the following dates:

05/25/2012

Affiant further deposes and says that neither the affiant nor The Scranton Times is interested in the subject matter of the aforesaid notice or advertisement and that all allegations in the foregoing statement as time, place and character or publication are true Gina Krushinski

Sworn and subscribed to before me
this 25th day of May A.D., 2012

Sharon Venturi
(Notary Public)



LEGAL NOTICE

Tobyhanna Army Depot
Tobyhanna, Pennsylvania
U.S. Army Begins Five-Year Review

The U.S. Army is working with the Environmental Protection Agency and Pennsylvania Department of Environmental Protection to conduct a five-year review at the Tobyhanna Army Depot (TYAD). The five-year review is being conducted to ensure the remedies enacted at three sites within the facility continue to protect human health and environmental concerns. This will be the third five-year review conducted at TYAD; earlier five-year reviews were completed in Fiscal Year (FY)02 and FY07.

The first site which is identified as Operable Unit (OU) 1 consists of two areas; a former burn and disposal site, (Area A); and a former drum staging zone (Area B). The remedies enacted at OU 1 involve natural attenuation, long-term monitoring and institutional controls to address groundwater contaminants. One of the focuses of the five-year review analysis of these areas will be to analyze indoor air sampling that was conducted in off-post resident's homes in FY11 and FY12.

The second site, OU 4, is an area within TYAD where Unexploded Ordinance (UXO) remains at the facility. This UXO was fired from projectiles from artillery ranges used in World War 1 and World War 2. The remedy for OU 4 includes public and employee education and institutional controls. The institutional controls consist of physical controls, security patrols, monitoring, UXO support, propriety controls and periodic review.

The final site, OU 5, is an inactive landfill. The remedies enacted at OU 5 involve natural attenuation, long-term monitoring and institutional controls. The remedies at this site address

volatile organic compounds, semi-volatile organic compounds and metals that remain at the landfill.

The five-year review report is scheduled for completion by September 30, 2012. Any comments concerning this review should be directed to Mr. Edwin Mickley by June 15, 2012; contact information is listed below.

Information Repository:

When completed, a copy of the final five-year review report will be available at the projects information repository:

Pocono Mountain Public Library
5540 Memorial Blvd. (Rt. 611)
Coolbaugh Township Municipal Center
Tobyhanna, Pennsylvania 18466
Telephone: (570) 894-8860
Hours: Monday and Wednesday
10 a.m. to 8 p.m.
Tuesday, Thursday, Friday and
Saturday 10 a.m. to 5 p.m.
Sunday Closed

Contact Information:

If you have any concerns about the OU 1, OU 4 and OU 5 sites, please contact:

Mr. Edwin Mickley
Public Affairs Officer
Tobyhanna Army Depot
11 Hap Arnold Blvd.
Tobyhanna, PA 18466-5076
Telephone: (570) 615-7308
E-mail: edwin.j.mickley.civ@mail.mil

POCONO RECORD

www.pocorecord.com

511 Lenox Street - Stroudsburg, PA 18360

(570) 421-3000

WESTON SOLUTIONS, INC
ATTN: DEB VOLKMER (BLDG 5-2)
PO BOX 2653
WEST CHESTER, PA 19380

ACCOUNT# 612566

Proof of Publication Notice in the Pocono Record

Commonwealth of Pennsylvania
County of Monroe

Kelli McFall Classified Manager of the Pocono Record having been duly sworn according to law, deposes and says the Pocono Record is a Newspaper of general circulation published at 511 Lenox Street, Stroudsburg, Monroe County, Pa. The Pocono Record was established on April 2, 1894 and has been regularly published and issued in Monroe County since that time. The printed notice attached to this affidavit is exactly the same as was printed and published in the regular editions and issues of the Pocono Record on the dates listed below the bottom of this notice. I certify that I am duly authorized to verify this statement under oath and am not interested in the subject matter of the attached notice or advertisement. All allegations in this affidavit as to time, place, and character of publication are true.

Copy of notice

**PUBLIC NOTICE
FIVE-YEAR REVIEW**
The U.S. Army is working with the Environmental Protection Agency and the Pennsylvania Department of Environmental Protection to conduct a five-year review of the Tobyhanna Army Depot (TYAD).

The five-year review is being conducted to ensure the remedies enacted at three sites within the facility continue to protect human health and environmental concerns.

This will be the third five-year review conducted at TYAD, after five-year reviews were completed in Fiscal Year (FY) 02 and FY07.

The first site which is identified as Operable Unit (OU) 1 consists of two areas: a former burn and disposal site, (Area A) and a former drum staging area (Area B). The remedies enacted at OU 1 involve natural attenuation, long-term monitoring and institutional controls to address groundwater contaminants. One of the focuses of the five-year review analysis of these areas will be to analyze indoor air sampling that was conducted in off-post residents' homes in FY11 and FY12.

The second site, OU 4, is an area within TYAD where Unexploded Ordnance (UXO) remains at the facility. This UXO was fired from projectiles from artillery ranges used in World War I and World War II. The remedy for OU 4 includes public and employee education and institutional controls. The institutional controls consist of physical controls, security patrols, monitoring, UXO support, property controls and periodic review.

The final site, OU 5, is an inactive landfill. The remedies enacted at OU 5 involve natural attenuation, long-term monitoring and institutional controls. The remedies at this site address volatile organic compounds, semi-volatile organic compounds and metals that remain at the landfill.

The five-year review report is scheduled for completion by September 30, 2012. Any comments concerning this review should be directed to Mr. Edwin Mickley by June 15, 2012; contact information is listed below.

Information Repository
When completed, a copy of the final five-year review report will be available at the project's information repository:

Pocono Mountain Public Library
2040 Memorial Blvd. (Rt. 811)
Coolbaugh Township Municipal Center, Tobyhanna, PA 18468
(570) 894-3880

Hours: Monday and Wednesday, 10 a.m. to 5 p.m.; Tuesday, Thursday, Friday and Saturday, 10 a.m. to 5 p.m.; Sunday, closed.

If you have any concerns about the OU 1, OU 4 and OU 5 sites, please contact Mr. Edwin Mickley, Public Affairs Officer, Tobyhanna Army Depot, 81 Hap Arnold Blvd., Tobyhanna, PA 18468-6076; (570) 615-1209; edwin.mickley.civ@mail.mil.

Weston Solutions, Inc.
1400 Westin Way
West Chester, PA 19380

P - May 25

Kelli McFall

Sworn to and subscribed
to before me this day

2012

Janene L. Fischer-Snyder

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Janene L. Fischer-Snyder, Notary Public
Stroudsburg Area, Monroe County
My Commission Expires March 28, 2014
Member, Pennsylvania Association of Notaries

PUBL
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EXPIRE DATE
5/25/2012

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PUBLIC NOTICE

#TIMES
1

AMOUNT
\$131.00

/2012

END DATE 5/25/2012

FINAL

APPENDIX G

MEC HAZARD ASSESSMENT

MEC HA Summary Information

Site ID: Target Area No. 5, OU-4, TYAD
Date: 6/8/2012

Comments

Please identify the single specific area to be assessed in this hazard assessment. From this point forward, all references to "site" or "MRS" refer to the specific area that you have defined.

A. Enter a unique identifier for the site:

TYAD-02-R-01

Provide a list of information sources used for this hazard assessment. As you are completing the worksheets, use the "Select Ref(s)" buttons at the ends of each subsection to select the applicable information sources from the list below.

Ref. No. Title (include version, publication date)

| | |
|----|--|
| 1 | MEC Removal Action, Site-Specific Final Report, 2009 |
| 2 | Remedial Investigation, Draft Final, 2011 |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

B. Briefly describe the site:

1. Area (include units): Approximately 40 acres

2. Past munitions-related use:

Target Area

3. Current land-use activities (list all that occur):

Tobyhanna Army Depot Radar Facilities

4. Are changes to the future land-use planned? No

5. What is the basis for the site boundaries?

Historical information and on-site observations during Removal Action at Target Area No.5 location. Approximately 40 acres.

6. How certain are the site boundaries?

Confident in boundaries.

Reference(s) for Part B:

MEC Removal Action, Site-Specific Final Report, 2009

C. Historical Clearances

1. Have there been any historical clearances at the site?

Yes, subsurface clearance

2. If a clearance occurred:

a. What year was the clearance performed?

1998, 2008, &
2009

b. Provide a description of the clearance activity (e.g., extent, depth, amount of munitions-related items removed, types and sizes of removed items, and whether metal detectors were used):

Locate, identify, and dispose of MEC; surface and subsurface down to 4 ft bgs; 37mm, 60mm, 75mm, 155mm, 1907 PTF Fuse, 3-pounder Navy common projectile, Grenade, pyrotechnic simulator, trip flare, white phosphorus grenade; Schonstedt magnetic Locators.

Reference(s) for Part C:

MEC Removal Action, Site-Specific Final Report, 2009

D. Attach maps of the site below (select 'Insert/Picture' on the menu bar.)

Site ID: **Target Area No. 5, TYAD**
Date: **6/8/2012**

Cased Munitions Information

| Item No. | Munition Type (e.g., mortar, projectile, etc.) | Munition Size | Munition Size Units | Mark/ Model | Energetic Material Type | Is Munition Fuzed? | Fuzing Type | Fuze Condition | Minimum Depth for Munition (ft) | Location of Munitions | Comments (include rationale for munitions that are "subsurface only") |
|----------|--|---------------|---------------------|-------------|-------------------------|--------------------|-------------|----------------|---------------------------------|------------------------|---|
| 1 | Artillery | 37 | mm | MK II | | UNK | UNK | UNK | 0 | Surface and Subsurface | |
| 2 | Artillery | 37 | mm | M6 | | UNK | UNK | UNK | 0 | Surface and Subsurface | APT |
| 3 | Mortars | 60 | mm | M49A2 | | UNK | UNK | UNK | 0 | Surface and Subsurface | |
| 4 | Artillery | 75 | mm | M48 | | UNK | UNK | UNK | 0 | Surface and Subsurface | |
| 5 | Artillery | 75 | mm | NA | | No | UNK | UNK | 0 | Surface and Subsurface | Shrapnel |
| 6 | Artillery | 75 | mm | M1 | Pyrotechnic | UNK | UNK | UNK | 0 | Surface and Subsurface | FM Smoke |
| 7 | Artillery | 155 | mm | M107 | | UNK | UNK | UNK | 0 | Subsurface Only | |
| 8 | Artillery | 155 | mm | NA | | No | UNK | UNK | 0 | Surface and Subsurface | Shrapnel |
| 9 | Fuzes | 1907 | | PTTF/PD | Spotting Charge | UNK | UNK | UNK | 0 | Subsurface Only | Combo Fuze, Black Powder |
| 10 | Fuzes | | | M38 | Spotting Charge | UNK | UNK | UNK | 0 | Subsurface Only | |
| 11 | Artillery | 3 | lb | | | UNK | UNK | UNK | 0 | Surface and Subsurface | Navy Common Projectile |
| 12 | Grenades | | | M15 | | No | UNK | UNK | 0 | Subsurface Only | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 17 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 19 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |

Reference(s) for table above:

MEC Removal Action, Site-Specific Final Report, 2009



Bulk Explosive Information

| Item No. | Explosive Type | Comments |
|----------|----------------|----------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

Reference(s) for table above:

MEC Removal Action, Site-Specific Final Report, 2009
Remedial Investigation, Draft Final, 2011



Site ID: **Target Area No. 5, TYAD**
Date: **6/8/2012**

Activities Currently Occurring at the Site

| Activity No. | Activity | Number of people per year who participate in the activity | Number of hours per year a single person spends on the activity | Potential Contact Time (receptor hours/year) | Maximum intrusive depth (ft) | Comments |
|---|-----------------------|---|---|--|------------------------------|---|
| 1 | Radar Testing Grounds | 10 | 2,080 | 20,800 | 0 | Any given day there are between 3 - 10 people. 8 hrs/day @ 260 days/yr. |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |
| Total Potential Contact Time (receptor hrs/yr): | | | | 20,800 | | |
| Maximum intrusive depth at site (ft): | | | | | 0 | |

Reference(s) for table above:
MEC Removal Action, Site-Specific Final Report, 2009
Remedial Investigation, Draft Final, 2011



Site Accessibility Input Factor Categories

The following table is used to determine scores associated with site accessibility:

| | Description | Baseline Conditions | Surface Cleanup | Subsurface Cleanup |
|----------------------------|--|------------------------|--------------------|-----------------------|
| Full Accessibility | No barriers to entry, including signage but no fencing | 80 | 80 | 80 |
| Moderate Accessibility | Some barriers to entry, such as barbed wire fencing or rough terrain | 55 | 55 | 55 |
| Limited Accessibility | Significant barriers to entry, such as unguarded chain link fence or requirements for special transportation to reach the site | 15 | 15 | 15 |
| Very Limited Accessibility | A site with guarded chain link fence or terrain that requires special equipment and skills (e.g., rock climbing) to access | 5 | 5 | 5 |

Current Use Activities

Select the category that best describes the site accessibility under the current use scenario:

Very Limited Accessibility

Baseline Conditions:

Surface Cleanup:

Subsurface Cleanup:

Score

5

5

5

Potential Contact Hours Input Factor Categories

The following table is used to determine scores associated with the total potential contact time:

| | Description | Baseline Conditions | Surface Cleanup | Subsurface Cleanup |
|----------------|------------------------------------|------------------------|--------------------|-----------------------|
| Many Hours | ≥1,000,000 receptor-hrs/yr | 120 | 90 | 30 |
| Some Hours | 100,000 to 999,999 receptor hrs/yr | 70 | 50 | 20 |
| Few Hours | 10,000 to 99,999 receptor-hrs/yr | 40 | 20 | 10 |
| Very Few Hours | <10,000 receptor-hrs/yr | 15 | 10 | 5 |

Current Use Activities :

Input factors are only determined for baseline conditions for current use activities. Based on the 'Current and Future Activities' Worksheet, the Total Potential Contact Time is:

Based on the table above, this corresponds to a input factor score for baseline conditions of:

receptor
20,800 hrs/yr
40 Score

Amount of MEC Input Factor Categories

The following table is used to determine scores associated with the Amount of MEC:

| | Description | Baseline Conditions | Surface Cleanup | Subsurface Cleanup | |
|--|--|------------------------|--------------------|-----------------------|-------|
| Target Area | Areas at which munitions fire was directed | 180 | 120 | 30 | |
| OB/OD Area | Sites where munitions were disposed of by open burn or open detonation methods. This category refers to the core activity area of an OB/OD area. See the "Safety Buffer Areas" category for safety fans and kick-outs. | 180 | 110 | 30 | |
| Function Test Range | Areas where the serviceability of stored munitions or weapons systems are tested. Testing may include components, partial functioning or complete functioning of stockpile or developmental items. | 165 | 90 | 25 | |
| Burial Pit | The location of a burial of large quantities of MEC items. | 140 | 140 | 10 | |
| Maneuver Areas | Areas used for conducting military exercises in a simulated conflict area or war zone | 115 | 15 | 5 | |
| Firing Points | The location from which a projectile, grenade, ground signal, rocket, guided missile, or other device is to be ignited, propelled, or released. | 75 | 10 | 5 | |
| Safety Buffer Areas | Areas outside of target areas, test ranges, or OB/OD areas that were designed to act as a safety zone to contain munitions that do not hit targets or to contain kick-outs from OB/OD areas. | 30 | 10 | 5 | |
| Storage | Any facility used for the storage of military munitions, such as earth-covered magazines, above-ground magazines, and open-air storage areas. | 25 | 10 | 5 | |
| Explosive-Related Industrial Facility | Former munitions manufacturing or demilitarization sites and TNT production plants | 20 | 10 | 5 | |
| Select the category that best describes the <i>most hazardous</i> amount of MEC: | | | | | Score |
| Target Area | | | | | 180 |
| Baseline Conditions: | | | | | 120 |
| Surface Cleanup: | | | | | 30 |
| Subsurface Cleanup: | | | | | |

Future Use Activities
Deepest intrusive
depth:

ft

Not enough information has been entered to determine the input factor category.

Score

Migration Potential Input Factor Categories

Is there any physical or historical evidence that indicates it is possible for natural physical forces in the area (e.g., frost heave, erosion) to expose subsurface MEC items, or move surface or subsurface MEC items?

Yes

If "yes", describe the nature of natural forces. Indicate key areas of potential migration (e.g., overland water flow) on a map as appropriate (attach a map to the bottom of this sheet, or as a separate worksheet).

Frost heaves, up to 2 ft bgs, or movement from original placement from human processes (e.g., construction).

The following table is used to determine scores associated with the migration potential:

| | Baseline Conditions | Surface Cleanup | Subsurface Cleanup |
|----------|------------------------|--------------------|-----------------------|
| Possible | 30 | 30 | 10 |
| Unlikely | 10 | 10 | 10 |

Based on the question above, migration potential is 'Possible.'

Score

Baseline Conditions:

30

Surface Cleanup:

30

Subsurface Cleanup:

10

Reference(s) for above information:

MEC Removal Action, Site-Specific Final Report, 2009
Remedial Investigation, Draft Final, 2011

MEC Classification Input Factor Categories

Cased munitions information has been inputted into the 'Munitions, Bulk Explosive Info' Worksheet; therefore, bulk explosives do not comprise all MECs for this MRS.

The 'Amount of MEC' category is 'Target Area'. It cannot be automatically assumed that the MEC items from this category are DMM. Therefore, the conservative assumption is that the MEC items in this MRS are UXO.

Has a technical assessment shown that MEC in the OB OD Area is DMM?

No

Are any of the munitions listed in the 'Munitions, Bulk Explosive Info' Worksheet:

- Submunitions
- Rifle-propelled 40mm projectiles (often called 40mm grenades)
- Munitions with white phosphorus filler
- High explosive anti-tank (HEAT) rounds
- Hand grenades
- Fuzes
- Mortars

| | UXO | Baseline Conditions | Surface Cleanup | Subsurface Cleanup |
|------------------------|-----|---------------------|-----------------|--------------------|
| UXO Special Case | | 180 | 180 | 180 |
| UXO | | 110 | 110 | 110 |
| Fuzed DMM Special Case | | 105 | 105 | 105 |
| Fuzed DMM | | 55 | 55 | 55 |
| Unfuzed DMM | | 45 | 45 | 45 |
| Bulk Explosives | | 45 | 45 | 45 |

Score

| | |
|----------------------|-----|
| Substrate Condition: | 110 |
| Surface Cleanup: | 110 |

MEC Size Input Factor Categories

| Description | | Baseline Conditions | Surface Cleanup | Subsurface Cleanup |
|-------------|--|------------------------|--------------------|-----------------------|
| Small | Any munitions (from the 'Munitions, Bulk Explosive Info' Worksheet) weigh less than 90 lbs; small enough for a receptor to be able to move and initiate a detonation | | 40 | 40 |
| Large | All munitions weigh more than 90 lbs; too large to move without equipment | | 0 | 0 |

Small
Score

| | |
|----------------------|----|
| Baseline Conditions: | 10 |
| Surface Cleanup: | 40 |

| | |
|---------------------|----|
| Surface Cleanup: | 10 |
| Subsurface Cleanup: | 40 |

[illegible]

Scoring Summary

| | | | |
|---|--|--|---------------------------|
| Site ID: | Target Area No. 5, OU-4, TYAD | a. Scoring Summary for Current Use Activities | |
| Date: | 6/8/2012 | Response Action Cleanup: | No Response Action |
| Input Factor | Input Factor Category | Score | |
| I. Energetic Material Type | Pyrotechnic | 60 | |
| II. Location of Additional Human Receptors | Inside the MRS or inside the ESQD arc | 30 | |
| III. Site Accessibility | Very Limited Accessibility | 5 | |
| IV. Potential Contact Hours | 10,000 to 99,999 receptor-hrs/yr | 40 | |
| V. Amount of MEC | Target Area | 180 | |
| VI. Minimum MEC Depth Relative to Maximum Intrusive Depth | Baseline Condition: MEC located surface and subsurface. After Cleanup: Intrusive depth overlaps with subsurface MEC. | 240 | |
| VII. Migration Potential | Possible | 30 | |
| VIII. MEC Classification | UXO | 110 | |
| IX. MEC Size | Small | 40 | |
| | | Total Score | 735 |
| | | Hazard Level Category | 2 |

| MEC HA Hazard Level Determination | | | |
|---|--|-----------------------|------------|
| Site ID: Target Area No. 5, TYAD | | Hazard Level Category | Score |
| Date: 6/8/2012 | | | |
| a. Current Use Activities | | 2 | 735 |
| b. Future Use Activities | | 4 | 420 |
| c. Response Alternative 1: | | | |
| d. Response Alternative 2: | | | |
| e. Response Alternative 3: | | | |
| f. Response Alternative 4: | | | |
| g. Response Alternative 5: | | | |
| h. Response Alternative 6: | | | |
| Characteristics of the MRS | | | |
| Is critical infrastructure located within the MRS or within the ESQD arc? | | Yes | |
| Are cultural resources located within the MRS or within the ESQD arc? | | No | |
| Are significant ecological resources located within the MRS or within the ESQD arc? | | No | |